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ABSTRACT

Described in this report are the results of a survey of 27 libraries which had in operation 40 mechanized systems for acquisition, cataloging and circulation control. The libraries were selected on the basis of advanced performance in the state of the art of library automation. The overall trends show libraries increasing their use of on-line systems and basic assembly language programming, and moving into the area of catalog mechanization. The data describing each library activity was collected by an interview consisting of a presentation by the library staff and the completion of a questionnaire. A bibliography of published system descriptions and a directory of addresses and telephone numbers of the principal staff members of the libraries visited is included. The information presented in the report should be useful in ascertaining what has already been mechanized in acquisition, cataloging and circulation control, whether it is available for transfer to another installation, and what detailed functions it mechanizes. A second use of the information in the report is as an automation check list if one is designing his own mechanized library system. (Author/SJ)

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FINAL REPORT
PHASE I: SURVEY OF AUTOMATED LIBRARY SYSTEMS

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ABSTRACT

This report describes the results of a survey of 27 libraries which had in operation 40 mechanized systems for acquisition, cataloging and circulation control. The libraries were selected on the basis of advanced performance in the state of the art of library automation. The overall trends show libraries increasing their use of on-line systems and basic assembly language programming, and moving into the area of catalog mechanization. The data describing each library activity was collected by an interview consisting of a presentation by the library staff and the completion of a questionnaire. The presentation of the library activity was summarized into a "System Overview". The data from the questionnaires was tabulated on project summary sheets which facilitate easy comparison of each library's processing capabilities. Also, the totality of processing functions observed in all systems was tabulated for the purpose of providing a single list of all such mechanized library processing functions. A bibliography of published system descriptions and a directory of addresses and telephone numbers of the principal staff members of the libraries visited is included. The information presented in the report should be useful in ascertaining what has already been mechanized in acquisition, cataloging and circulation control, whether it is available for transfer to another installation, and what detailed functions it mechanizes. A second use of the information in the report is as an automation check list if one is designing his own mechanized library system.

1. INTRODUCTION & SUMMARY

The California State University and Colleges operate a major academic library at each of 19 campuses, and a small supporting library for the Chancellor's Office. Each library renders a wide range of library services for its faculty and students as well as for other State residents. In common with all major academic libraries, there exist problems in providing user service, maintaining collection quality, and in the provision of general support services required by the academic community on each campus. These problems have been compounded by budget stringencies, and austere library staffing. To find relief from these resource problems the college librarians have followed library automation developments carefully and now seek to apply such technology to these resource problems.

The librarians also have observed that large-scale operational automated library systems historically have had good and bad results. Thus, while the librarians would like to have the benefits of automation, they do not want to risk library services to an uncertain course of action; nor commit major resources to strictly experimental and undocumented systems whose operational performance cannot be accurately predicted.

In order to initiate a program of automation to provide future benefits for the CSUC libraries, a program called the Library System's Project has been established as a working partner for the CSUC librarians to provide the needed library support in automation.

In this program of library automation planning and development a need arose for a survey of the automation activities at libraries in the United States and Canada. The results of such an investigation would provide information on what was needed in a mechanized system by observations of what others are doing, an easier and less time consuming task than defining needs from scratch through design sessions. Also many of these systems in operation are available for transfer wholly or in part, at a great saving in cost, if the host computer environment planned by CSUC is appropriate

Because the staff required for a complete survey exceeded that available at the Library Systems Project Office, it was decided to contract the work to a consulting and systems design firm with experience in library automation. Inforonics, Inc. of Maynard, Mass., a firm who had performed work for the Library of Congress and the New England Library Information Network (NELINET), was chosen to perform the survey.

The survey was divided into two phases: Phase I, a broad survey overview of existing automated systems, and Phase II, a detailed study of three systems. The Phase I project was performed in three months, and this report describes the results of that survey.

Survey Objective

The objective of the study was to gather data describing the best systems in operation at this time. Additional supporting data required consist of the answers to the following general questions about the automated system:

What do they do?

Do they work or are they only planned?

Are they practical?

What do they cost to operate?

Are they transferrable to CSUC?

Survey Methodology

The means prescribed to gather data was a survey. The survey consisted of:

1. Designing a questionnaire and selecting a set of libraries.
2. Visiting libraries and interviewing people responsible for the automated system.
3. Tabulating, comparing and analyzing data collected.
4. Preparation of a final report.

This procedure was deemed the best way to collect a large amount of data in a short time using different people to perform the interviews.

Summary Findings

Approximately 1,000 pages of questionnaires, short reports, journal articles and other raw data were collected, as well as many personal observations. The bulk of this report is devoted to tabulating and analyzing this data. In summary, however, it was found that:

1. The systems observed worked in a practical manner.
2. None of the systems were total--that is, performed all functions which could be automated in a library.
3. Nearly all of the systems were being modified to add improvements and/or additional operating functions, or to lower processing costs.
4. Nearly all of the systems used a university or library cooperative computing center.
5. A few libraries had minicomputers in the library for in-house processing tasks.
6. The librarians said that the basic technical competence of library professionals and clerical staff was adequate to perform any of the new tasks required by automated library operation. Few libraries had any formal training procedures.
7. Some of the systems are transferrable at the computer code level. More are transferrable at the requirement and systems design level.
8. The majority of the librarians said that their system cost less than manual ones, and as time progresses automated system costs would increase more slowly than manual system costs. Also as more functions were added to the systems, additional savings

in cost would result. Some thought costs would be the same or higher, but overall costs would not continue to increase at the same rate, i.e., the automated systems would stem the tide of spiraling costs.

Future Use of Survey Data

The report which follows can be considered a description of the present state of library automation systems implementation. To make a more complete overview it seems appropriate to begin the report with a short review of library automation leading up to the present. Those who are familiar with this history may skip to Section 3.

2. REVIEW OF LIBRARY AUTOMATION

2.1 Early Applications

The early applications of data processing to libraries began over 20 years ago with the use of punch card systems for acquisition and circulation control. The problem with the early systems was that many compromises in standard library practices were required in order to use machines designed primarily for accounting. In addition, the early efforts did nothing to solve or aid in some of the complex intellectual tasks required in acquisition, cataloging, and use of library materials. Because these early efforts were so limited in scope and so foreign to conventional practice, their adaption was unnoticeable in the library world.

2.2 Major Development Efforts

More serious library automation efforts were begun when the following took place:

1. "Documentalists" defined here as people interested in storing and searching report and journal literature, bolted the ranks of librarians and began designing and operating systems outside of the libraries, aided by funding sources external to those available to libraries,
2. The recent education boom fostered a large increase in publishing and thus acquisitions by libraries, and an increased number of libraries to be built from scratch to serve the new colleges and universities. These activities placed a large workload on the available library talent with the result that librarians began to look to automation for help.

3. The rise in salaries of the intellectual and skilled clerical labor required in libraries began to seriously affect library budgets. Further it was recognized that the steady rise in these labor rates is not being offset by any increase in productivity because there were no mechanized aids being installed.

These situations prompted a flurry of development in the past 10 years which has continued to the present time. The major results have been the following:

2.3 Machine Data Bases and Searching

One effort sponsored primarily by "documentation" people was aimed at developing machine files of journal and report literature searchable by subject, author, source, and other descriptive cataloging data. These development efforts are still underway but currently are at a much more modest scale. The "documentalists" have not completely solved this report literature problem, and many have returned to the ranks of the libraries and library activities, bringing with them, to the good we think, a lot of converted engineers and computer people. The "documentalists" learned that topical searching of very large files is very difficult, but they also learned how to design text data bases, and proceded using good cataloging practices to apply this data base knowledge to descriptive cataloging elements and entries. Early work led to a set of experiments at the Library of Congress, which were continued in a pilot project called L.C. MARC I. This project resulted in the establishment of L.C. MARC II data base, which now is a well understood standard.

2.4 Clerical and Accounting Aids

The second effort was the development of improved machine aids to the typing and accounting processes involved in book acquisition. Beginning with the early punch card systems converted to computer operation, these systems have been in a constant state of development. The acquisition problem is complicated and it has taken a long time to develop a comprehensive one. A normal business would be in trouble indeed if it has purchasing problems akin to those in library acquisition, where you buy in a quantity of one, from over 5,000 possible vendors, and where the identification of what you are buying changes as new editions come out, where the vendor will tell you he intends to publish and doesn't, and fails to tell you he changed his mind. Because the acquisition process contains a myriad of problems, the design of a basic purchasing system can be improved upon ad infinitum to solve them. This is what has happened until at present we have some quite complete powerful systems in operation though none solves all problems.

2.5 Aids to the Intellectual Process

The third type of library automation effort begun only more recently is the development of methods of increasing the productivity of the professional and semi-professional library staff. These activities center around the bibliographic search and cataloging processes, and aids have been developed for the reformatting and automatic typing of bibliographic material, and the easy editing or revision of such material. These operations also support the use of the cataloging in acquisition and reference search. These developments have appeared much later than acquisition because new computer equipment and software were required to allow large files to be readily accessable to library personnel. These latter cataloging developments are new and not developed to the extent of acquisitions systems, however they hold the most promise for gain in personnel productivity. They also foretell an increase in scope of library service by connecting users and reference staff to reference data bases outside of a local library.

2.6 Present Situation

All of this brings us to the present. From what we have seen in our survey, the problems with the developments of the recent past, primarily high cost and inaccurate system objectives are over. The new time-sharing computer equipment, software power and flexibility, the maturing of newer library school graduates with systems and data processing training into management positions, and the attitude of progressive library managers seeking to improve libraries service to cost ratio, combine to make a powerful team. At this time, we say such a team can survey operational requirements, identify processing functions, design or adapt a system, program, deliver and install it on a predictable cost and time schedule.

3. DESCRIPTION OF DATA COLLECTION ACTIVITIES

Authorization to proceed with Phase I of the project was given on July 18, 1972. Work began immediately and continued in an intensive manner throughout the summer. Tabulation, summation and evaluation of the data took place in October, and a final presentation was made on October 20.

3.1 Library Selection

The first step in the Library System Evaluation was the development of a list of systems to be surveyed. The criteria for selections were:

1. The operational state of the system.

It was desired to survey systems that were in operation, not merely in the planning or design phase.

2. The growth potential of the system.

It was desirable to study systems which intended to grow and mechanize additional library operations, not systems which were at the end of their development potential.

3. The extent to which the library was mechanized.

Libraries with more than one function mechanized were desirable candidates for they more closely approached a total system.

A basic list of systems to be surveyed was provided to Inforonics in the CSUC request for proposal. This list was expanded using the advice of our staff and library consultants.

Telephone contact was made with each library on the list, and a brief inquiry was made into the state of their library's automation activity, whether they were willing to participate in the survey project, who was the proper person to visit, and what visit dates were convenient. The results of these conversations were recorded on a Telephone Survey Data Sheet and summarized on a final list of libraries to be visited.

Inforonics' staff and consultants were assigned to each library and the list was submitted for approval to the Library System Project and its Technical Advisory Committee. The list was approved with one or two changes in libraries selected and consultant assignments.

Several additions to the list were made during the course of the survey as either we or the Library Systems Project staff learned of other library automation projects. In all 27 libraries were visited.

3.2 Development of Survey Questionnaires

Simultaneously with the refinement of the list of libraries to be surveyed, the questionnaires were designed. The use of these questionnaires facilitated the easy comparison of sets of data collected by different interviewers at different institutions. A survey questionnaire, containing a set of data items which describe the mechanized processes, was developed for each function: acquisition, cataloging and circulation control. A first draft questionnaires in each of these three areas was tested by a visit to one of the libraries which had mechanized its acquisition, cataloging and circulation control functions. Problems with the questionnaire were discovered during the interview, and some questions were modified to correct these problems. The questionnaires were revised and presented to the Library Systems Project and its Technical Advisory Committee, who requested the addition of a sectio on personnel data, and approved the questionnaires.

3.3 Visitations

After receiving approval of the questionnaires and list of libraries, a final schedule of visits was arranged. The visits ranged from one to two days and the interviews took between three and ten hours. The longer visits were required for those libraries which had more than one function mechanized.

A typical visit began with the library staff member cognizant o the automation activities briefing the interviewer for 1/2 to 1 hour. The interviewer took notes during this briefing and asked questions of clarification only. These notes were written up as a System Overview of each library. The System Overviews are contained in Appendix A. Next, the applicable questionnaires were completed during a question and answer dialog. In all libraries, some data were not available or the interviewee was reluctant to provide it.

At the end of the interview, a cover sheet, which listed all of the personnel responsible for the library management and systems design activities as well as the university administration, was filled out. The purpose of this cover sheet was to provide a point of contact for further discussion with the library. These cover sheets are included as Appendix B. Samples of the questionnaires are included as Appendix C.

Approximately six weeks was expended in the major portion of this interviewing activity although a few libraries were visited in the second and third months due to scheduling difficulties.

3.4 Interview Success

The interviews were very successful for several reasons. First the interview was conducted in person, so the interviewee did not have to struggle alone with long forms and the problem of interpretation of questions. Dialog with the interviewer quickly straightened out any ambiguities. Second, the interviewer was a person with a record of accomplishment in library automation, so that complicated points in design or operational philosophy mentioned by the interviewee were under-stood and appreciated. Third, the questionnaire was good and made the interview interesting. Several interviewees mentioned that the interview was a useful design and review exercise because the questionnaire had such a complete set of questions.

3.5 Limitations of Survey

The data collected in the interview was in most cases complete. Its accuracy could not be verified because there was no time for extended tours and inspection of the library activities, however we have no reason to doubt the answers given us. Also there was no time to review the completed questionnaires or overviews with the library staff during the data summarizing activity, although it would have been useful to do so. In some cases we were told that a particular new process was not installed yet. Such a process was included as operational if its installation date was within three months, and its predecessor system was operational.

The primary limitation in the data collected is that some was not available. Either it was unknown at the time of the interview, or in the case of the opinion type questions, the interviewee preferred not to answer.

3.6 Survey Follow-up

Once the interviews were completed, the task of summarizing and comparing the data was begun. Additional information was sometimes needed, and if important the library was contacted by telephone.

4. GENERAL SYSTEMS CONFIGURATIONS

In reviewing all of the detail of the data contained in the questionnaires, it is very difficult to obtain an overall picture of the computer and communication environments of the mechanized library operations. Such a description is provided here to give a review of the "forest" prior to looking at the "trees", and to provide definitions of terminology used later in this report.

4.1 Off-line Batch Processing

Off-line batch processing, shown in Figure 1, is the most common computer configuration available to libraries using data processing. In using off-line batch processing, data are delivered to the computer in magnetic tapes, punch cards, or punch tape form. The computer processes the library's job according to a schedule dedicating the entire computer or some segment of the computer to the job.

The encoding devices used by the library to prepare input data can be card punches, paper tape keyboards, magnetic tape keyboards. More complex off-line encoding devices are exemplified by the Colorado Instruments circulation control input in which card reading terminals are connected to a device called a "pooler" which gathers the separate terminal inputs onto a single magnetic tape to be sent to the computer.

The outputs delivered to the library from this type of system are printed lists, printed cards, reports, punch cards for circulation control, etc.

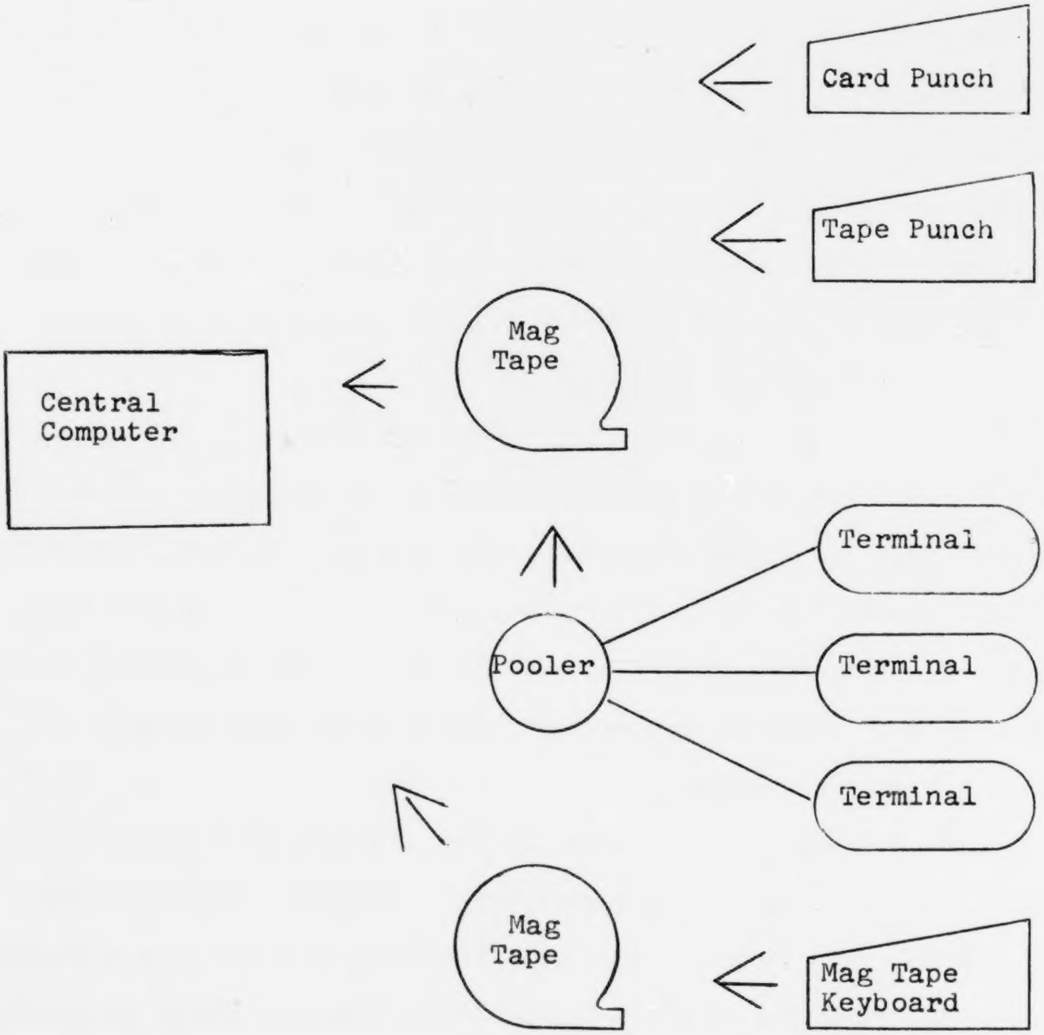
Card Punch
Tape Punch
Mag Tape
Central Computer
Terminal
Pooler
Terminal
Terminal
Mag Tape
Mag Tape Keyboard

FIGURE 1

4.2 On-line Direct Terminal Connection

In an on-line computing system the library user is connected to the computer at all times. The on-line computer is processing many jobs at once, and can allocate part of its central processing unit to each user to process part of their job, going on to the next user and repeating this cycling continuously, until all jobs are completed. In addition to this cycling, user priorities can be set up so that low priority tasks are delayed for high priority jobs. For example, a large low priority printing task such as a book catalog can be delayed momentarily while data from a high priority circulation control transaction is processed.

An on-line system with direct terminal connection is shown in Figure 2.

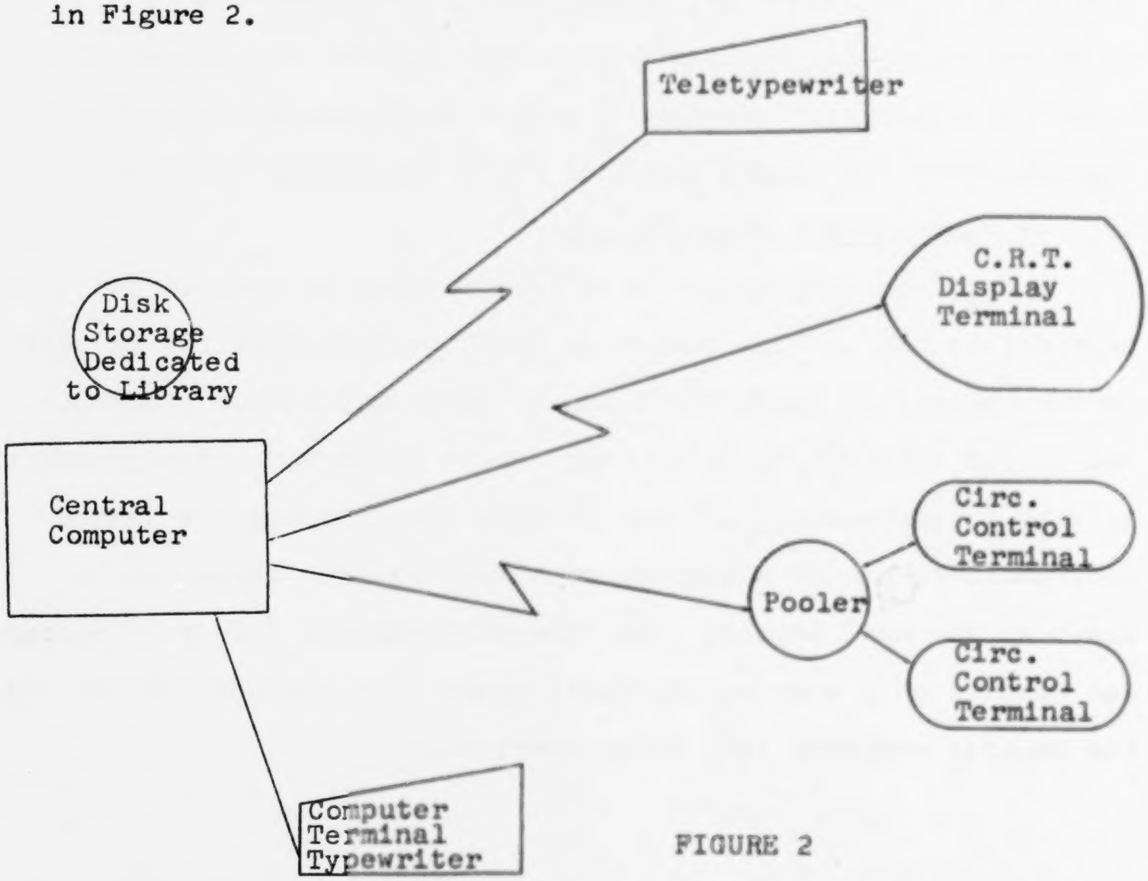
Teletypewriter
C.R.T. Display Terminal
Disk Storage Dedicated to Library
Central Computer
Circ. Control Terminal
Pooler
Circ. Control Terminal
Computer Terminal Typewriter

FIGURE 2

The input devices for direct terminal connection can be a teletypewriter, computer terminal typewriter, cathode ray tube (CRT) display, circulation control card reading stations, or the poolers of other terminals.

The outputs in addition to off-line printed lists, cards, etc., are messages typed or displayed directly at the input terminal. The capability offered by an on-line system is that of rapid (often instantaneous) response to searches or questions.

The central computer for most library processing must have disk storage dedicated to library uses. This disk storage is analogous to,and performs the same functions as, a manually used card file. The amount of storage available limits the scope of automation applications. For example, the search of books in circulation requires a much smaller amount of storage compared with the amount required for a searchable catalog.

4.3 On-Line Library Minicomputer

When a minicomputer is used in a library to connect its terminal to the central computer, additional flexibility is obtained in the variety of tasks which can be performed in the library, and in the schedule on which they can be performed. A mini-computer is more flexible than a pooler because the minicomputer can be programmed to handle a variety of tasks, and new tasks can be added as the need arises. Also the minicomputer with some storage can operate on a stand-alone basis apart from the computer should the central computer fail or be overloaded.

Figure 3 shows such a configuration. The minicomputer storage is a variable. More storage obviously enables the minicomputer to perform more tasks, or handle more volume between calls to the central computer. The connection to the central computer can be automatic under the control of each and can be continuous, hourly or daily.

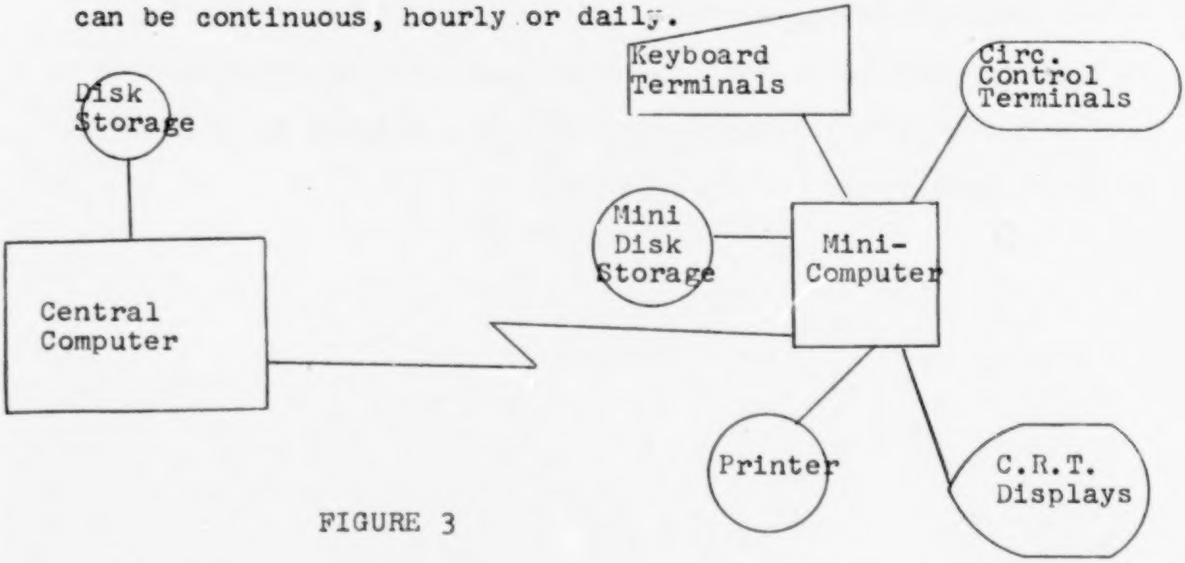
Keyboard Terminals
Circ. Control Terminals
Disk Storage
Mini Disk Storage
Mini-Computer
Central Computer
Printer
C.R.T. Displays

FIGURE 3

4.4 Pooling Data Entered from Terminal

In a "pooler" data is accepted from terminals character by character and processed to create integrated records to be recorded on tape or transmitted directly to the central computer.

4.5 Polling Data Entered from Terminals

In a "polling" system all terminals are connected to a single telephone line, a computer scans each terminal to see if it has data to transmit or if it is ready to receive data from the computer. If so the computer receives from or transmits to the terminal. While it is polling that terminal it cannot receive or transmit data to or from any other terminal.

Polling terminals usually have the internal capability to store, display and edit small amounts of data on a local basis which allows an operator to enter, view, and change data without interacting with the central computer for each keystroke. Interaction takes place only when a search, store record, or delete record command is made, and because the transmission to the computer is so fast, many messages can be interspersed before one terminal transmission delays a display to another so as to be bothersome to its operator.

5. COMPOSITE SYSTEMS FUNCTIONS

During the comparison of the questionnaires data it was found that different libraries mechanized different functions. It became evident that an overall picture showing the totality of functions which had been mechanized would be a useful design tool.

The data was analyzed to obtain an enumeration of all mechanized functions observed, which has been named Composite Systems Functions. Although the lists are lengthy and contain all data collected, it should be pointed out that there undoubtedly are additional functions which could be mechanized.

5.1 Acquisition

All of the processing functions researched in acquisition are listed below.

Request Processing

The following types of requests were processed by the system.

- Faculty requests
- Library staff requests
- Replacement or added copy requests
- Approvals
- Standing orders

Search

- Search public catalog and on order card files
- Search public catalog card file and on order list
- Search public catalog and on-line or order file
- Search on-line public catalog and on order file
- Search MARC magnetic tape files

- Order Processing Operation
    - Validate input record
    - Create in process file
    - Print requestor notification
    - Request approval
    - Print on order list
    - Print permanent order list
    - Print o.p. request list
    - File update for each order status change
    - Cancel
    - Claim
    - Display status
    - Reorder from different vendor
    - Print purchase orders
    - Print cancellation list
- Receiving and Accounting Processing
    - Update file with receipt information
    - Check invoices
    - Prepare checks or vouchers
    - File update
    - Update fund allocations; encumberances; liquidations
    - Update totals, allocations; encumberances; liquidations
    - Check on "special vendors"
    - Check discounts offered to discounts received
    - Handling of partial shipments
- Workflow monitoring

5.1.1 Equipment Used in Surveyed Institutions

Computers

- IBM System 360, Models 30 or larger
- PDP-11 (Digital Equip. Corp.)
- PDP-10 (Digital Equip. Corp.)
- Honeywell 316 (mini)
- PDP-8 (Digital Equip. Corp.)
- RCA SPECTRA
- IBM 370, Model 145 & 155
- Univac 9400
- CDC 3300
- IBM System 360, Model 20

Terminals

- Teletype Corp. ASR-33 & 35
- CENTRONIC
- Mohawk
- IBM 2741, 2740, 357, 826
- Mohawk 2404
- IBM 2260 CRT*
- Datapoint CRT
- Sanders 804 CRT
- CDC 211 CRT
- Hazletine CRT

Printers

- IBM 1403
- Mohawk Line Printer
- CDC 501

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*Cathode Ray Tube, here a video display

5.2 Cataloging

All of the processing functions recorded in the cataloging systems observed are listed below

- Search
    - Search MARC on-line
    - Search MARC off-line
    - Search cooperative catalog on-line
    - Search vendor data base
- Processing
    - Create worksheet from data base
    - original cataloging
- Encoding
    - Encode (keyboard) bibliographic data
    - Computer prompting
    - MARC II tag validation
    - Editing on-line for corrections and revisions
    - Editing off-line for corrections and revisions
    - Encode holdings & location information
    - File update
        - Create search keys
        - Sort & merge entries
- Print
    - Request catalog cards
    - Request cross reference cards
    - Print catalog cards
    - Print cross reference cards
    - Print book catalogs

5.2.1 Bibliographic Data Files

The bibliographic files observed contained the following data element sets. Each of the files contained both L.C. cataloging and original cataloging.

Full MARC II (both L.C. produced and locally produced)

MARC II encoded from catalog cards (these records would omit
    minor elements which need the book to be in hand during
    tagging)

Modified MARC II (Significant MARC II data elements left out)

Short entry (defined to cover those files which contained
    a few abbreviated bibliographic data elements)

Local Holdings Data
    Existence only (book is in system)
    Location (No. of levels varies-system, library, branch,
        shelf)
    Copy/volume information
    Variant cataloging data
    N.U.C. code

Cross Reference & Authority Files

5.2.2 Equipment

The following equipment was observed in the survey of cataloging systems:

Computers
    XDS Sigma 5
    XDS Sigma 7
    IBM 370
    RCA Spectra*
    IBM 360
    PDP-11 (Digital Equip. Corp.)

---

*Now Univac 70 series

Terminals

- IBM 2741, 2260
- Teletype 37KSR*
- IRASCOPE CRT
- Sanders 804 CRT
- Mohawk 2804

Printers

- XEROX XGP
- IBM 1403
- RCA Videocomp**

---

* Keyboard Send and Receive

** A computer-driven photocomposition device

5.3 Circulation Control

The functions observed in the circulation control systems surveyed are listed below:

- Availability Search
    - Search by call number
    - Search by title
    - Search by author-title
    - Search by accession number

All of these access means used either on-line terminal search or search of printed lists.

- Display Response to Search
    - Bibliographic description
    - Location (shelf location or who has it)

Transaction Processing

- Charge Out
    - Enter transaction record by cards
    - Enter transaction record by keyboard
    - Check fine status
    - Enter fine payment
    - Print fine receipt
    - Print charge out slips, page slips, and due date slips
    - Enter recall request
    - Print recall notice
    - Enter renewal request
    - Print renewal slip

Transaction Processing (con't)

- Enter reserve request
- Print reserve notice
- Create reserve no longer available notice
- Print mailing labels (for remote borrower)
- Lost card input
- Special user input
- Supervisor override
    - Fines
    - Overdue
    - Lost card
    - Forgotten card
    - Credit risk

Returns & New Books

- Add to transaction record & store in history file
- Hold for reserve
- Print book available notice
- Enter credit risk data

Overdues

- Sense overdue & print notice
- Print fine notice
- Enter fine status

Management Data Processing

- Note multiple reserves
- List lost books
- List books by borrower
- Generate orders for lost books
- Generate orders for added copies
- Enter replacement charge in fine status
- Update holdings for new books
- List books by non-patron borrower
- Personnel leaving hold
- Update holdings for salvage titles
- Enter data for temporary reserve collections
- Compute loans by:
  - Classification
  - Type
  - Borrower Type
  - Publication Date
- Compute total loans

5.3.1 Circulation Control Data Files

The types of files observed and their constituent items are listed below:

Borrower Data Files

- Patron
    - Name I.D. No. Address
    - Type or types
- Non-patron borrower
    - Bindery
    - Book repair
    - Shelf location - special collection
    - Temporary library reserve
    - Book display
    - Photoduplication
    - Lost items
- Interlibrary loan
    - Name & address
- Temporary Reserve (Prof. of Dept. head)

Bibliographic Item Files

- Main entry
- Title
- Imprint
- Publication

Bibliographic Item Files (con't)

- Holdings
  - Location
  - Classification
  - Book No. (Copy volume)
  - Accession Number
- L.C. Card Number
- Material type
- Loan period

5.3.2 Equipment

The equipment used in the circulation control system is listed below.

- Computers
  - IBM 360
  - IBM 370
  - PDP-10 (Digital Equipment Corp.)
  - Honeywell 316 (mini)
  - System 7 (IBM)
  - Univac 9400
  - PDP-11 (Digital Equipment Corp.)

Terminals

- Colorado Instruments (off-line circ system)
- Addressograph Multigraph
- Datapoint CRT
- IBM 1030 and Acc.
- Teletype ASR & KSR 33's
- Decitron two badge reader & keyboard
- IBM 2260
- NCR 260
- IBM 2791

Printers

- IBM 1403
- Mohawk strip printer
- Mohawk line printer

6. SURVEY DATA COMPARISONS

The summarizing of all of the information collected was a formidable task. Following the specification of the Library Systems Project procurement, summary charts were prepared which showed which libraries had which functions mechanized.

The data collected on the questionnaires are posted on the charts labeled Figure 4, 5, 6. The chart provides a handy reference to determine which systems have particular attributes, i.e., which are on-line, which use higher level programming languages, and which functions they have mechanized. In reviewing our notes and plotting all of the questionnaire data on the charts we noticed common characteristics of groups of systems and also characteristics unique to a single system. A description of these common and unique characteristics is presented here as a useful adjunct to the charts for it will save the reader time in his perusal of the data looking for general characteristics.

6.1 Acquisition System Characteristics

6.1.1 Characteristics common within groups of systems

a. A large number of acquisition in-processing states were observed.

The number of states of a request or an order reveals the complexity of the acquisition process, especially when foreign purchases are concerned.

b. Large systems compute foreign exchange.

In the larger universities with considerable foreign purchases currency exchange is a big enough problem to warrant mechanization.

c. Several systems use minicomputers to handle communications and local processing.

d. Large systems put requests in machine form.

In larger universities which acquire hard-to-find material, requests are put in machine form because it may be some time before a citation is found accurate enough to be used for an order.

6.1.2 Unique features of single systems

a. COM printout in-process lists.

In one large system, the in-process lists were so large that COM (Computer Output on Microfilm) was used to reduce costs of printing.

b. MARC search to obtain cataloging data as a byproduct of ordering.

One system observed searched MARC II tapes during acquisition to obtain a record which was used to make a worksheet to be used in cataloging.

6.2 Cataloging System Characteristics

6.2.1 Characteristics common within a group of systems

a. Upper case/lower case used.

Most catalog printout or display systems used a full upper and lower case character set.

b. All systems use validation.

Cataloging records have a required internal consistency, which when in error, can be spotted by logical validation procedures.

c. On-line systems use prompting.

The on-line cataloging and data entry systems helped the cataloging staff by displaying possible tags, noting misspelled tags, and in general leading the operator through the data entry process.

6.2.2 Unique characteristics of single systems

a. Catalog card printing

The Xerox Graphic Printer (XGP) was observed printing catalog cards at high speed in two sizes of type. This print capability allows more print to be carried on a single card.

b. Cooperative Machine Data Base

One cataloging system served many libraries and shared a central cooperatively maintained catalog data base. Its advantage was that the disk storage cost of a large catalog data base was spread over a large number of users.

c. Multi level authority to enter and change data

One system observed provided several levels of checks to prevent unknowledgeable staff from inadvertantly modifying or revising catalog records.

6.3 Circulation System Characteristics

6.3.1 Characteristics common within groups of systems

a. Upper case printer used exclusively

None of the circulation systems used upper case/lower case print chains although most of the information presented was textual. One might infer that for the business aspects of libraries procurement upper case alone is good enough, but for the bibliographic aspects (catalog search) it is not.

b. Book borrower cards nearly universally used

With one exception, all of the libraries used book borrower cards suggesting a saving of book description transcription labor on the part of the library patron and user.

c. Complex management analyses done on demand

Trend in collection usage or other data analysis tasks performe with the circulation history records were done on demand.

d. The newer systems used on-line computing.

6.3.2 Unique characteristics of single systems

a. Unassisted student book checkout

One library was connecting a strip printer to its book charge out system so that a due date slip was printed for the student who would present it to the guard at the library entrance.

b. Minicomputer used to control transactions and other technical processing activities.

In one installation the library owned a minicomputer which performed other library processes simultaneously with circulation control.

c. Prompting terminal minimizes training.

One library interviewed used a terminal with a console which instructed the operator in the required sequence of operations so that little or no training was required.

d. Integrated bibliographic file used for circulation catalog and acquisitions

One on-line system had one file containing circulation, cataloging and acquisition data. This approach saved costly disk space.

e. Complete on-line file used for circulation only

Several systems maintained a complete file of short bibliographic entries on-line for circulation control only.

f. System component for temporary reserves

One system contained the capability for placing large numbers of books comprising course reading lists on temporary reserve at the request of professors and department heads.

7. TIME TRENDS IN AUTOMATED LIBRARY SYSTEMS

In addition to the complete listing of the questionnaire data presented in the previous section, we think it is useful to present an analysis of some of the aspects of library automation as a function of time.

The 27 automated systems studied in this report do not represent a random sample of such systems but rather a sample selected on the basis of advanced performance to the extent that this could be determined from our knowledge of the state of the art augmented by a number of conversations with knowledgeable people in the field. To the extent that this sample does represent the work of the more advanced institutions, certain tentative conclusions can be drawn as to the direction that library automation is going over the next several years.

As the sample is relatively small (particularly for the study of time development in various directions) it is useful to break the sample, timewise, at a particular point in time and discuss the systems prior to this point as the "old" systems and those implemented after this point as the "new" system. A study of the data shows that the most convenient break point is 1 January 1970.

A breakdown of the 27 systems by time and primary function is given in Table 1.

Table 1
Number of Automated Systems Studied by Time and Primary Function

	Pre-1970	Post-1970
Acquisitions	7	8
Circulation	6	7
Cataloging	0	10

	LIB-F	LIB-K	LIB-O	LIB-P	LIB-C	LIB-D	LIB-Y	LIB-E	LIB-R	LIB-A	LIB-B	LIB-J	LIB-Q	LIB-I	LIB-H	LIB-G	LIB-S	LIB-W	
GENERAL CHARACTERISTICS																			GENERAL CHARACTERISTICS
DATE INSTALLED	1966(R-72)	1964	1968	1968	1969	1969	1969	1970	1970	1971	1971	1971	1972	1972	1972	1972	1972	1968	DATE INSTALLED
CONTROLS MONOGRAPHS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	CONTROLS MONOGRAPHS
CONTROLS A-V & MAPS	YES	NO	NO	NO	NO	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	YES	NO	YES	CONTROLS A-V & MAPS
CONTROLS SERIALS	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	NO	NO	NO	NO	NO	YES	CONTROLS SERIALS
HANDLES FACULTY REQ.	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	HANDLES FACULTY REQ.
HANDLES LIBRARY REQ.	NO	YES	YES	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	YES	YES	YES	NO	HANDLES LIBRARY REQ.
MAKES WANT LISTS	NO	YES	YES	NO	NO	NO	YES	NO	YES	NO	YES	YES	NO	NO	NO	NO	NO	NO	MAKES WANT LISTS
CONTROL OVER INPROCESS	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	CONTROL OVER INPROCESS
CLAIM PERIODS DIFFERENT	YES	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	NO	CLAIM PERIODS DIFFERENT
CONV. FOREIGN CURRENCY	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	NO	NO	NO	CONV. FOREIGN CURRENCY
PARTIAL SHIPMENTS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	PARTIAL SHIPMENTS
AUTO. CANCELLATION NOT.	NO	YES	NO	NO	NO	NO	YES	YES	NO	YES	NO	NO	NO	NO	YES	YES	YES	NO	AUTO. CANCELLATION NOT.
AUTO. REISSUE/2ND VEND.	NO	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	AUTO. REISSUE/2ND VEND.
HANDLES DELAYED ITEMS	YES	NO	YES	NO	YES	YES	NO	YES	NO	YES	YES	YES	NO	YES	NO	YES	YES	NO	HANDLES DELAYED ITEMS
DEPOSIT ACCT. HANDLING	NO	NO	YES	NO	NO	YES	YES	NO	YES	YES	YES	YES	NO	YES	NO	YES	NO	YES	DEPOSIT ACCT. HANDLING
DUPLICATE BILLING CK.	NO	NO	YES	NO	NO	YES	YES	NO	NO	YES	NO	NO	NO	YES	NO	YES	NO	YES	DUPLICATE BILLING CK.
PAY IN ADVANCE	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NO	YES	PAY IN ADVANCE
FUND REPORTING	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	NO	YES	FUND REPORTING
MISC. CHARGE TOTALS	YES	NO	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	YES	MISC. CHARGE TOTALS
AUTO. CK/DUP ORDERS	YES	NO	YES	NO	NO	YES	NO	NO	NO	YES	YES	NO	YES	YES	YES	YES	NO	NO	AUTO. CK/DUP ORDERS
ACCEPTS BUDGET CHANGES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NO	YES	ACCEPTS BUDGET CHANGES
BRING FWD PRIOR YR BAL	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES	NO	YES	BRING FWD PRIOR YR BAL.
BRING FWD PRIOR YR ENCUM	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES	NO	YES	BRING FWD PRIOR YR ENCUM
ELIMINATE DUP/STANDING OR.	YES	NO	YES	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	NO	NO	NO	NO	ELIMINATE DUP/STANDING OR.
UPDATE VENDOR FILE	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	NO	NO	UPDATE VENDOR FILE
SPECIAL PROC/SOME VENDORS	YES	YES	YES	NO	NO	NO	YES	NO	YES	YES	NO	YES	YES	NO	NO	YES	NO	YES	SPECIAL PROC/SOME VENDORS
AUTO FUND ASSGN BY SUBJ	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	NO	AUTO FUND ASSGN BY SUBJ
DOES SYS GENERATE CAT INPUT	NO	NO	NO	NO	NO	NO	YES	YES	NO	YES	YES	YES	YES	YES	NO	NO	YES	NO	DOES SYS GENERATE CAT INPUT
DOES SYS GENERATE CIRC INPUT	NO	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	YES	NO	YES	NO	NO	NO	NO	DOES SYS GENERATE CIRC INPUT
INPUT FROM MARC	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	YES	NO	INPUT FROM MARC
INPUT FROM VENDOR TAPES	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	INPUT FROM VENDOR TAPES
INPUT FROM LIB CAT	NO	NO	NO	NO	NO	NO	YES	YES	NO	YES	NO	NO	NO	YES	NO	NO	YES	NO	INPUT FROM LIB CAT
HISTORY FILE KEPT	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	HISTORY FILE KEPT
HIST FILE STORAGE MED	TAPE	TAPE	TAPE	TAPE	TAPE	TAPE	NO	TAPE	TAPE	DISC	NOT AVAIL	DISC	DISC	TAPE	TAPE	DISK	TAPE	TAPE	HISTORY FILE STORAGE MED
HIST FILE LIST ARR.	ORDER NO	NO	ORDER NO	ORDER NO	NOT AVAIL	ORDER NO	LC NO	ORDER NO	CHRONO/ SUBJ	NO	ORDER NO	SEARCH KEY	NOT AVAIL	CHRONO	NOT AVAIL	NOT AVAIL	LIB & TIT	NO	HIST FILE LIST ARR.
HIST FILE INDEXES	YES	NO	NO	NO	NOT AVAIL	YES	YES	YES	NO	NO	NO	YES	NOT AVAIL	NO	NOT AVAIL	NO	NO	NO	HIST FILE INDEXES
DATA BASE																			DATA BASE
ON-ORDER FILE SIZE	85-87K	35-50K	12K	40-50K	30-40K	35K	6-10K	75K	4-8K	10K	60K+	20K	50K	10K	500K	75K	50K	9K	ON-ORDER FILE SIZE
NO TYPES OF ORDER	8	1	1	12	7	10	1	10	10	7	10	7	1	7	2	5	NOT AVAIL	7	NO TYPES OF ORDER
MAX CHAR/RECORD	450	96	2K	250	111	350	250	600	204	800	1000	3K	NO LIMIT	2048	42-55	228	500	80	MAX CHAR/RECORD
NO DATA ELEMENTS	33	20	150	30	9	20-25	15	60	30	50	28	30	150	37	20	16	11	11	NO DATA ELEMENTS
ON-LINE	NO	NO	YES	NO	NO	12 HR/DAY	NO	9 HR/DAY	5 HR	9 HR	NO	15 HR	12 HR	NO	8 HR	12 HR	NO	NO	ON-LINE
BATCH	DAILY	YES	NITELY	DAILY	YES	NO	YES	NO	NO	NO	DAILY	NO	NO	YES	NO	NO	16 HR	YES	BATCH
VENDOR FILE SIZE	734	200	100	4-5K	4700	7K	26	7K	3K	10K	50-60	200	100	600	3500	3600	NO	NOT AVAIL	VENDOR FILE SIZE
NO TYPES VENDOR	NOT AVAIL	3	1	2	2	NOT AVAIL	20	NOT AVAIL	2	5	10	1	1	2	2	1	NO	NOT AVAIL	NO TYPES VENDOR
AVG CHAR/RECORD	150	96	NOT AVAIL	150	NOT AVAIL	174	225	174	128	150	150	229	NO LIM	179	200	235	NO	6	AVG CHAR/RECORD
NO DATA ELEMENTS	7	20	3-4	6	6	5	20	5	5	8	2	5	10	22	50	16	NO	NOT AVAIL	NO DATA ELEMENTS
FUND FILE SIZE	260	NO	55	200	387	35K	50	75K	50/1000	400	205	80	NO	5K	5-10K	400	NO	10K	FUND FILE SIZE
NO LEVELS OF IDEN	3	NO	NOT AVAIL	10	32	3	2	3	3	2	3	2	NO	5	2	2	NO	3	NO LEVELS OF IDEN
NO FUNDS	260	NO	55	200	194	200	70	29	37	80	205	80	NO	5K	900	100	NO	130	NO FUNDS
NO CHAR/RECORD	60	NO	100	160	80	4	100	30	80/4*	80	120	40	NO	70	20	115-365	NO	80	NO CHAR/RECORD
NO OF DATA ELEMENTS	7	NO	15	12	11	11	5	4	5/1*	20	12	7	NO	12	4	10	NO	NOT AVAIL	NO OF DATA ELEMENTS
PRODUCTS & SERVICES																			PRODUCTS & SERVICES
ORDER NO.	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	YES	YES	ORDER NO.
LC CARD NO.	NO	NO	NO	NO	NO	YES	NO	YES	NO	YES	YES	BATCH ONLY	YES	YES	YES	NO	YES	NO	LC CARD NO.
ISBN NO.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	BATCH ONLY	NO	YES	YES	NO	YES	NO	ISBN NO.
MAIN ENTRY (AUTHOR ACCESS)	NO	NO	NO	YES	NO	YES	YES	NO	YES	YES	YES	YES	YES	NO	NO	YES	YES	NO	MAIN ENTRY (AUTHOR ACCESS)
TITLE	NO	NO	NO	YES	NO	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	YES	YES	YES	TITLE
PUBLISHER	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	PUBLISHER
VENDOR	NO	NO	NO	NO	NO	NO	YES	NO	NO	YES	YES	NO	NO	NO	NO	NO	YES	YES	VENDOR
FUND	NO	NO	NO	NO	NO	NO	YES	NO	NO	YES	YES	NO	NO	NO	NO	NO	NO	YES	FUND
SERIES TITLE	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	SERIES TITLE
DATE ORDERED	NO	NO	NO	NO	NO	NO	YES	NO	NO	YES	YES	NO	NO	NO	NO	NO	YES	YES	DATE ORDERED
NOTIFICATION/ORDER/REQUESTOR	NO	YES	YES	NO	YES	YES	YES	YES	NO	YES	YES	NO	YES	NO	NO	NO	YES	YES	NOTIFICATION/ORDER/REQUESTOR
NOTIFICATION ITEM AVAILABLE	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	NO	NO	YES	YES	NOTIFICATION ITEM AVAILABLE
OUTSTANDING ORDER LIST	YES	YES	YES	YES	NO	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	YES	OUTSTANDING ORDER LIST
ACCESSION LISTS	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	YES	NO	NO	NO	NO	YES	ACCESSION LISTS
INVOICE VOUCHER	NO	YES	YES	NO	NO	NO	YES	NO	NO	NO	YES	YES	NO	YES	YES	YES	NO	YES	INVOICE VOUCHER
CHECKS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	YES	NO	YES	CHECK.

Figure 4

ACQUISITION SYSTEMS COMPARISON

DELINQUENT ORDER LIST	YES	YES	YES	YES	ON REQ.	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NO	NO	YES	DELINQUENT ORDER LIST
CLAIM NOTICES	YES	NO	YES	YES	NO	YES	YES	YES	NO	YES	YES	YES	NO	YES	NO	YES	YES	NO	CLAIM NOTICES
CANCELLATION LISTS	YES	YES	NO	YES	NO	YES	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	NO	YES	CANCELLATION LISTS
VENDOR LISTS	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	VENDOR LISTS
MANAGEMENT INFO																			MANAGEMENT INFO
NO OF TITLES ORDERED	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES	YES	YES	YES	NO OF TITLES ORDERED
ORDERS BY TYPE OF MATERIAL	NO	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	NO	YES	NO	NO	NO	NO	NO	ORDERS BY TYPE OF MATERIAL
ORDERS BY FUND	NO	YES	YES	NO	YES	NO	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	NO	NO	ORDERS BY FUND
ORDERS BY FUND THEN SUB	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO	NO	NO	ORDERS BY FUND THEN SUB
ORDERS BY LANGUAGE	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	ORDERS BY LANGUAGE
ORDERS BY SUBJECT	YES	NO	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	NO	ORDERS BY SUBJECT
ORDERS BY COUNTRY	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	ORDERS BY COUNTRY
NO ORDERS FOR DUPLICATES	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO ORDERS FOR DUPLICATES
EXP BY TYPE OF MATERIAL	NO	NO	YES	NO	NO	YES	YES	NO	YES	YES	YES	NO	NO	NO	NO	YES	NO	NO	EXP BY TYPE OF MATERIAL
EXP BY FUND	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NO	NO	EXP BY FUND
EXP BY FUND THEN SUB	NO	NO	NO	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	YES	YES	NO	NO	NO	EXP BY FUND THEN SUB
EXP BY LANGUAGE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	NO	NO	YES	NO	NOT AVAIL	EXP BY LANGUAGE
EXP BY SUBJECT	YES	NO	NO	NO	NO	YES	NO	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	NOT AVAIL	EXP BY SUBJECT
EXP BY COUNTRY	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NOT AVAIL	EXP BY COUNTRY
TIME LAPSE FOR VENDORS	NO	YES	NO	YES	NO	NO	YES	NO	NO	YES	YES	NO	NO	YES	YES	YES	NO	NO	TIME LAPSE FOR VENDORS
NO. CLAIMS FOR VENDORS	NO	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	YES	NO	YES	NO	NO	NO. CLAIMS FOR VENDORS
CANCELLATIONS VS NO ORDERED	NO	NO	NO	NO	NO	NO	YES	NO	NO	YES	YES	NO	NO	YES	YES	YES	NO	NO	CANCELLATIONS VS NO ORDERED
DISC'T OFF VS DISC'T REC'D	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	YES	NO	YES	NO	NO	DISC'T OFF VS DISC'T REC'D
TIME LAPSE FOR ALL ORDERS	NO	NO	YES	NO	NO	NO	NO	YES	NO	YES	NO	NO	NO	YES	NO	YES	NO	NO	TIME LAPSE FOR ALL ORDERS
TOTAL FUNDS ENCUMBERED	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NO	YES	TOTAL FUNDS ENCUMBERED
TOTAL FUNDS LIQUIDATED	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NO	YES	TOTAL FUNDS LIQUIDATED
BALANCE	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NO	YES	BALANCE
SOFTWARE & HARDWARE																			SOFTWARE & HARDWARE
PROGRAM LANGUAGE	PL/1(F)	BAL	BAL & PL/1	COBOL	FORTRAN	COBOL, FASTER	COBOL	COBOL	FORTRAN 4 COMPASS	APL & PL/1	PL/1	BAL & COBOL	BAL & PL/360	PL/1	BAL	FLIRT	BAL	COBOL	PROGRAM LANGUAGE
LITERALS LOADED FROM TABLES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NOT AVAIL	LITERALS LOADED FROM TABLES
DOCUMENTATION	GOOD	FAIR	GOOD	FAIR	GOOD	FAIR	GOOD	GOOD	FAIR	GOOD	FAIR	FAIR	EXCEL.	GOOD	GOOD	GOOD	POOR	GOOD	DOCUMENTATION
COMPUTER	370/155	1005 UNIVAC	360/67-65	H-200	PDP-10	370/145	RCA 70/45	370/145	CDC 3300	370/155	360/91-75	370/135	360/67 PDP-11	360/67 360/20	360/40	LIBS100	370	360/40	COMPUTER
CORE	450K	4K	150K	32K	NOT AVAIL	112K	50K	112K	32K	300K	350-400K	36K	1 MIL.BYTE	150K	384K	12K	32K	32K	CORE
TERMINALS	NONE	NONE	(3)1050	NONE	ASR 33	(9)2260	NONE	(9)2260	211 CRT	(8)3270	NONE	(5)2740	SAN 804	360/20RJE	2740	103	(9)2404		TERMINALS
TAPE DRIVES	2	2	1	5	12	7	6	7	3	3	1	2	1	8	2	NONE	4	2	TAPE DRIVES
DISCS	4	0	10	1	21	14	1	14	3	8	2	6	2	26	8	2 DIABLO	2	1	DISC
TEL. LINES	NONE	NONE	3	NONE	4800B	2400B	NONE	2400B	COAX	9	NONE	2 HDWRD	2-9600B	4800B	YES	NONE	HDWRD	NONE	TEL. LINES
COSTS																			COSTS
DEVELOPMENT COST	$119K	NOT AVAIL	$200K	NOT AVAIL	NOT AVAIL	$15K	$125K	$120K CAT & ACQ	$90K	NOT AVAIL	$47K	NOT AVAIL	$2 MILLION ACQ & CAT	NOT AVAIL	$2 MILLION ACQ & CAT	$57K	$200K	NOT AVAIL	DEVELOPMENT COST
PRODUCTION COST	$1.00/T	NOT AVAIL	$5.50/T	$1-1.50/ VOL.	NOT AVAIL	NOT AVAIL	$1.89/ORD +.34/REC'D	$.90/T	NOT AVAIL	$19K/MO ACQ & CIR	$.94/ORD.	NOT AVAIL	NOT AVAIL	NOT AVAIL	$1.60 PROJ.	NOT AVAIL	NOT AVAIL	NOT AVAIL	PRODUCTION COST
LIBRARY SAYS SYS PROCESS. COST WILL BE	LOWER	LOWER	HIGHER	LOWER	HIGHER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	NOT AVAIL	LOWER	LOWER	NOT AVAIL	LOWER	LIBRARY SAYS SYS PROCESS. COST WILL BE
	LIB-F	LIB-K	LIB-O	LIB-P	LIB-C	LIB-D	LIB-Y	LIB-E	LIB-R	LIB-A	LIB-B	LIB-J	LIB-Q	LIB-I	LIB-H	LIB-G	LIB-S	LIB-W	

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* TWO FILES

* TWO FILES

Figure 5

Cataloging Systems Comparison

	LIB-Z	LIB-Y	LIB-D	LIB-E	LIB-N	LIB-T	LIB-U	LIB-J	LIB-A	LIB-L	LIB-B	LIB-H	LIB-Q	LIB-S	
DATE INSTALLED	1966	1969	1970	1970	1970	1970	1971	1971	1971	1971	1973	1972	1972	1972	DATE INSTALLED
MONOGRAPHS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	MONOGRAPHS
A-V	NO	YES	YES	YES	NO	YES	YES	NO	YES	NO	NO	NO	YES	NO	A-V
SERIALS	YES	YES	YES	YES	NO	YES	YES	YES	YES	NO	NO	NO	NO	NO	SERIALS
MAX. TITLES PROCESSING	60K/YR	NO LIMIT	200/DAY	2.5K/DAY	4K/DAY	400K/MO	NO LIMIT	100K	420K/YR	100K/YR	NO LIMIT	NO LIMIT	NO LIMIT	400K	MAX. TITLES PROCESSING
CUSTOM CAT CARD FORMAT	NO	NO	NO	NO	YES	YES	NO	YES	NO	YES	YES	NO	YES	YES	CUSTOM CAT CARD FORMAT
AUTHORITY FILE CONTROL	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	AUTHORITY FILE CONTROL
HOLDINGS INFO	YES	NO	NO	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES	NO	HOLDINGS INFO
DATA INPUT FROM ACQ	NO	YES	NO	YES	NO	NO	NO	YES	YES	NO	YES	NO	YES	NO	DATA INPUT FROM ACQ
DATA OUTPUT TO CIRC	NO	YES	NO	NO	YES	NO	NO	YES	YES	YES	YES	NO	YES	NO	DATA OUTPUT TO CIRC
DATA INPUT TO ACQ	NO	YES	YES	NO	YES	NO	NO	YES	YES	NO	NO	NO	YES	NO	DATA INPUT TO ACQ
NO OF CAT RECORDS	81K	146K	180K	455K	380K	1,500K	114K	80K	40K	185K	300K	50K/YR	NOT AVAIL	300K	NO OF CAT RECORDS
NO OF TYPES IDEN.	4	12	1	10	1	3	NOT AVAIL	6	5	4	1	1	1	1	NO OF TYPES IDEN.
MAX CHAR/RECORD	2742	400	2050	2050	2048	65K	3472	3K	210	4095	2048	NO LIMIT	NO LIMIT	MARC II	MAX CHAR/RECORD
NO OF DATA ELEMENTS	30	20	25	25	30	30+	38	30	50	20	30	50	150	MARC II	NO OF DATA ELEMENTS
FILE ON-LINE	NO	NO	NO	NO	YES	YES	NO	YES	YES	YES	NO	NO	YES	YES	FILE ON-LINE
FORMAT	F & V	F	V	V	F & V	F & V	F & V	F & V	F & V	V	F & V	V	F & V	F & V	FORMAT
STORAGE	DRUM	TAPE	TAPE	TAPE	DISC	DISC	DISC & TAPE	DISC	DISC	DISC & TAPE	DISC & TAPE	DISC	DISC	DISC & TAPE	STORAGE
UC/LC CHAR SET	NO	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	UC/LC CHAR SET
MARC TAPES USED	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	NO	YES	YES	MARC TAPES USED
OTHER DATA TAPES	YES	YES	NO	YES	NO	YES	YES	YES	YES	NO	YES	NO	NO	NO	OTHER DATA TAPES
RETAIN ALL MARC ITEMS	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	YES	NO	NO	YES	RETAIN ALL MARC ITEMS
USE C.I.P.	YES	NO	YES	YES	YES	YES	YES	YES	NO	NO	YES	NO	YES	YES	USE C.I.P.
ON-LINE KEYBOARDING	NO	NO	NO	NO	YES	YES	NO	YES	YES	YES	NO	NO	YES	YES	ON-LINE KEYBOARDING
SYSTEM VALIDATES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	SYSTEM VALIDATES
SYSTEM PROMPTS	NO	NO	NO	NO	YES	YES	NO	SOME	YES	YES	NO	NO	YES	NO	SYSTEM PROMPTS
BATCH	YES	YES	YES	YES			YES				YES	YES			BATCH
ON-LINE HRS/DAY	9 HRS				12 HRS	9 HRS		15 HRS	9 HRS	8 HRS			9 HRS	9 HRS	ON-LINE HRS/DAY
ACCESS: LC CARD NO.	YES	YES	YES	YES	YES	YES	YES	BATCH ONLY	YES	YES	YES	NO	YES	YES	ACCESS: LC CARD NO.
ISBN NO.	NO	NO	YES	YES	NO	YES	NO	BATCH ONLY	NO	YES	YES	NO	NO	YES	ISBN NO.
LOC ACC NO.	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	NO	YES	NO	LOC ACC NO.
MAIN ENTRY	NO	YES	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	MAIN ENTRY
TITLE	NO	YES	NO	NO	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	TITLE
ADDED ENTRY	NO	YES	NO	NO	NO	NO	YES	NO	YES	YES	YES	NO	YES	NO	ADDED ENTRY
SUBJ ENTRY	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES	YES	NO	YES	NO	SUBJ ENTRY
PUBLISHER	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	PUBLISHER
PLACE PUBLISHED	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	PLACE PUBLISHED
CALL NO.	YES	NO	NO	NO	NO	YES	YES	NO	YES	YES	YES	NO	NO	YES	CALL NO.
DISPLAY FULL RECORD	YES	NO	NO	NO	YES	YES	YES	NO	YES	YES	YES	NOT AVAIL	YES	NOT AVAIL	DISPLAY FULL RECORD
DISPLAY SHORT RECORD	YES	NO	NO	YES	YES	YES	NO	NO	NO	YES	YES	NOT AVAIL	YES	NOT AVAIL	DISPLAY SHORT RECORD
PRINT CAT. COPY/VER.	YES	YES	YES	YES	NO	YES	YES	YES	YES	NOT AVAIL	YES	NO	YES	NO	PRINT CAT. COPY/VER.
PRINT CATALOG CARDS	YES	NO	YES	YES	YES	YES	NO	YES	NO	YES	YES	YES	YES	YES	PRINT CATALOG CARDS
CARDS SORTED PRIOT/PTG	YES	NO	YES	NO	YES	NO	NO	YES	NO	YES	YES	NO	YES	NO	CARDS SORTED PRIOT/PTG
SHELF LIST CARDS	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	YES	SHELF LIST CARDS
CROSS REF CARDS	YES	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES	YES	CROSS REF CARDS
BOOK LABELS	NO	YES	NO	YES	NO	NO	NO	YES	NO	YES	YES	YES	YES	YES	BOOK LABELS
SPINE LABELS	NO	YES	NO	YES	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	SPINE LABELS
CIRC CARDS	NO	YES	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	NO	YES	CIRC CARDS
ACCESSION LISTS	NO	YES	NO	NO	NO	YES	YES	NO	NO	YES	NO	NO	NO	NO	ACCESSION LISTS
BOOK CATALOGS	YES	YES	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES	BOOK CATALOGS
MANAGEMENT INFO:															MANAGEMENT INFO:
NO. TITLES CAT.	YES	YES	NO	YES	YES	YES	YES	NO	NO	NO	YES	NO	YES	YES	NO. TITLES CAT.
BY LANGUAGE	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	BY LANGUAGE
BY COUNTRY	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	BY COUNTRY
BY TYPE	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	BY TYPE
TIME BETWEEN REC'D & CAT	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	TIME BETWEEN REC'D & CAT
PROGRAMS GEN.COST DATA	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	PROGRAMS GEN. COST DATA
PROG. LANGUAGE	COBOL BAL	COBOL	COBOL	COBOL	BAL	BAL	BAL	COBOL BAL	APL & PL/1	COB,FORT, PL/1,BAL	SPITBOL	BAL	PL/360 BAL	BAL	PROG. LANGUAGE
LITERALS FROM TABLES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	LITERALS FROM TABLES
DOCUMENTATION	FAIR	GOOD	GOOD	GOOD	GOOD	FAIR	GOOD	GOOD	FAIR	GOOD	GOOD	GOOD	EXCEL.	NO	DOCUMENTATION
COMPUTER	UNIVAC 1108	RCA 70/45	370/145	370/145	SIGMA 5	SIGMA 7	370/145	370/135	370/155	360/40	360/91	360/40	PDP-11 360/67	370	COMPUTER
CORE	196K	58K	112K	112K	256K	96K	160K	58K	300K	96K	UNKNOWN	384K	1 MIL.BYTES	32K	CORE
TERMINALS	33KSR	NONE	(4)029	(4)029	1RASCOPE CRT	10KSR37	(3)2740	(6)2740	(6)2741 (8)3270	(5)2741 (8)3270	NONE	(2)2260	(4)SANDERS 804	(9) MOHAWK 2404	TERMINALS
LINE PRINTER	1004	(2)ANALEX	(2)1403	(2)1403	1403	XEROX XGP	(2)1403	1403	1403	NOT AVAIL	1403	1403	1403	MOHAWK	LINE PRINTER
TAPE DRIVES	2	6	7	7	3	4	6	2	3	NONE	YES	2	1	4	TAPE DRIVES
DISC DRIVES	DRUM	1	14	14	16	16	6	6	3	1	YES	8	1	2	DISC DRIVES
DISC PACKS	2	1	28	28	30	75	24	9	4	1	YES	15	2	2	DISC PACKS
TEL. LINES	110 B	NONE	2400B COND	2400B COND	2400B DEDIC.	38 HDWIRE	3	2 HDWIRE	9	2	NOT AVAIL	2	/600B COND.	2 HDWIRE	TEL. LINES
COSTS															COSTS
DEVELOPMENT COST	$150K	NOT AVAIL	$8K	$120K ACQ & CAT	$300K	NOT AVAIL	$2 MILLION ACQ & CAT	NOT AVAIL	NOT AVAIL	NOT AVAIL	NOT AVAIL	$2 MILLION ACQ & CAT	$2 MILLION ACQ & CAT	NOT AVAIL	DEVELOPMENT COST
PRODUCTION/COST	$.95/TITLE	NOT AVAIL	$.25-.30	$.20/TITLE	NOT AVAIL	NOT AVAIL	$3.00/TITLE	NOT AVAIL	NOT AVAIL	NOT AVAIL	NOT AVAIL	NOT AVAIL	NOT AVAIL	NOT AVAIL	PRODUCTION COST
LIBRARY SAYS OPERATING COST WILL BE:	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	SAME	NOT AVAIL	LOWER	LOWER	NOT AVAIL	LIBRARY SAYS OPERATING COST WILL BE:
	LIB-Z	LIB-Y	LIB-D	LIB-E	LIB-N	LIB-T	LIB-U	LIB-J	LIB-A	LIB-L	LIB-B	LIB-H	LIB-Q	LIB-S	

Figure 6

CIRCULATION SYSTEMS COMPARISON

	LIB-P	LIB-O	LIB-W	LIB-B	LIB-C	LIB-AA	LIB-M	LIB-J	LIB-K	LIB-A	LIB-L	LIB-V
DATE INSTALLED	1965	1967	1967	1967	1968	1968	1970	1970	1970	1971	1972	1972
COVERS OTHER THAN MONOGRAPHS	MON/BD.SER	NO	ALL	MON/BD.SER	MONO	MON/BD.SER	ALL BUT UNBD.SER.	MON/BD.SER	ALL	ALL	ALL	MOST
BOOK/BORROWER CARDS	YES	YES	YES	BORROWER	YES	YES	NO	YES	YES	YES	YES	YES
CONVERSION	PART & AS NEEDED	AS USED	AS USED	AS USED	AS USED	ALL AT ONCE	ALL AT ONCE	ALL AT ONCE	ALL AT ONCE	AS USED	AS RECLASS	ALL NEW AS NEEDE
BORROWER FILE												
SIZE	30K	20K	30K	15K	30K	19.2K	60K	20K	15-40K	28K	15K	50-100K
TYPES	8	9	1	5	3	5	11	2	3	8	2	8
RECORD SIZE	NOT AVAIL	100	80	176	NOT AVAIL	304	4012	350	90	25	75	80
DATA ELEMENTS	5	4	5	12	NOT AVAIL	2	6	NOT AVAIL	20	5	6	5
ON-LINE	NO	NO	NO	NO	NO	YES	YES	NO	NO	YES	YES	YES
FORMAT	F	F & V	F	F	F	F	V	F & V	F & V	F & V	F	F
STORAGE	TAPE	DISC & TAPE	TAPE	DISC	TAPE	DISC	DISC	DISC	TAPE & CARDS	DISC	DISC	DISC
ITEM FILE												
SIZE	40-90K	18K	30K	110K	30K	250K	1000K	40-60K	60-150K	40K	185K	60K
RECORD SIZE	132	150	80	74	80	124	4012	70	90	800	132	130
DATA ELEMENTS	15	12	NOT AVAIL	8	14	22	15	6	20	50	20	20
ON-LINE	NO	NO	NO	NO	NO	YES	YES	YES	NO	YES	YES	YES
FORMAT	F	F	F	F	F	F	V	F	F & V	F & V	F	F
BYPROD OF CAT.	NO	NO	NO	NO	NO	YES	CURRENT	YES	NO	NO	YES	NO
ON-LINE QUERY ACC.	NO	NO	NO	NO	NO	YES	YES	YES	NO	YES	YES	YES
DUE DATE SLIPS	NO	NO	NOT AVAIL	NO	NO	NO	YES	YES	NOT AVAIL	YES	NOT AVAIL	NO
OVER DUE NOTICES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
LIST BY CALL NO.	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES
LIST/HIGH DEMAND	YES	NO	NOT AVAIL	NO	NO	YES	YES	NO	NO	NO	YES	YES
COMPUTER ANALYSIS OF MGMT DATA	(ABCD)	(ACDE)	(AC)	(ACD)	(ABCD)	(CD)	(ABC)	(ACD)	(AB)	PLANNED	(A)	(ACDE)
SOFTWARE	COBOL	PL/1	COBOL	COBOL +PL/1	COBOL	PL/1	PL/1 + BAL	BAL + COBOL	BAL+ RPG	ALP & PL/1	BAL	PL/1
HARDWARE												
COMPUTER	H-200 PDP-11	360/67	H-200	360/91-75	PDP-10 H316(RJE)	360/50	370/155	370/135	UNIVAC 9400	370/155	360/40	370/165 SYSTEM 7
CORE	32K	125K	32K	164K	NOT AVAIL	145K	768K	36K	32K	300K	54K	28K
TERMINALS	(29)IBM 1030	(3)COL.INS.	0	0	(7)1030	(13)2260 (2)1030	(33)NCR260 (15)IBM2260	(2)2740 1031-1033	0	(11)COL.INS	(6)2260 (5)1031	(7)2791 (1)33
TAPE DRIVES	5	1	2	0	8	2	4	2	4	3	0	0
DISC DRIVES	1	2	1	2	1	1	3	6	0	3	1	1
TEL. LINES	TWSTD PR	12PR/LEASED	NONE	NONE	2 COND.	15 COND.	300,4800B	(2)HDWIRE	NONE	HDWIRE	600,2400B	HDWIRE
COSTS												
DEVELPMT COST	$10K	$60K	NOT AVAIL	$13K	NOT AVAIL	$27K	NOT AVAIL	NOT AVAIL	NOT AVAIL	NOT AVAIL	NOT AVAIL	NOT AVAIL
PRODUCTION COST COMPUTER	NOT AVAIL	NOT AVAIL	NOT AVAIL	$2170/MO	NOT AVAIL	$20.3K/YR	NOT AVAIL	$1400/MO	$1600/MO	$19K/MO ACQ & CIR	NOT AVAIL	$61K/YR
LIB SAYS PROC COST WILL BE:	LOWER	NOT AVAIL	LOWER	NOT AVAIL	HIGHER	LOWER	NOT AVAIL	NOT AVAIL	NOT AVAIL	NOT AVAIL	LOWER	SAME
	LIB-P	LIB-O	LIB-W	LIB-B	LIB-C	LIB-AA	LIB-M	LIB-J	LIB-K	LIB-A	LIB-L	LIB-V

The most obvious conclusion to be drawn from Table 1 is that automated cataloging systems are all new whereas both circulation and acquisitions systems date back before 1970 (the earliest being dated to 1965). Thus it is meaningful to talk of "first generation" and "second generation" acquisition and circulation systems (and the differences will become more obvious shortly) but that cataloging systems are all in a "first-generation" mode. (There were, of course, a number of book catalog systems developed in the 1960's, particularly for public library systems where the utility of having copies of the system catalog at each branch library is rather obvious. Among major university libraries, however, book catalogs produced from magnetic tape form data bases are still rare, the Widener Shelf List* - which will not be completed for some time to come - being exceptional. Automated cataloging systems for the purposes of this study are systems which produce standard sets of library cards from magnetic tape form data bases.)

It seems reasonable to suggest that the work in automated cataloging systems was held back until the arrival of MARC-II format with the concurrent committment by the Library of Congress to continue the distribution of MARC records for all English language materials begun on an experimental basis with MARC-I. It should also be noted that the portion of the cataloging activity that is devoted to providing access to the library's holdings by author, title, or call number can be combined with the circulation activity as has been done at Ohio State University, Western Kentucky University, etc. Such access can be provided by the so-called "short title" record format much of which is either desirable or necessary in the circulation file.

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* not studied in this survey

That there are indeed significant operational differences between the first and second generation systems can be seen from Table 2 which further subdivides Table 1 according to whether the system is an on-line or batch system. (All on-line systems batch process some operations, so a system should not be evaluated in terms of on-line vs. batch, but rather in terms of how much on-line processing is done.)

Table 2

Number of Automated Systems Studied broken down by time, primary function, and on-line and batch capabilities

	Acquisitions		Circulation		Cataloging	
	Batch	On-line	Batch	On-line	Batch	On-line
Pre 1970	5	2	5	1	0	0
Post	3	6	1	6	5	5

For both acquisitions and circulation there is a clear turn around from predominately batch to predominately on-line systems. Some of this turn around might be explained by the newness of on-line capability and the associated tendency of university communities to experiment with new technical capibilities, particularly when the equipment is available on campus. However, discussion with the individuals on the several sites where on-line systems were in operation makes it evident that on-line costs have been reduced in recent years and that there are significant on-line benefits available even though there is not total agreement on just what aspects of the various operations are most economically operated in the on-line mode. This view is further enhanced by the number of respondents from the "all batch so far" community who plan to add on-line capabilities in the near future (or when conversion funds are available). Further, several of the systems not herein reported, such as the acquisitions system at the Ohio College Library Center, (because they are not yet operational) will be on-line systems. (Note that these counts do reflect the Stanford University SPIRES/ BALLOTS system which has just come "on the air" in the last month and is only beginning to provide useful products.)

In short there is no longer any question that future systems will include selected on-line capabilities. The question rather is deciding which functions will have on-line implementation.

In cataloging, the trend towards on-line capabilities is less pronounced: only half of the ten systems studied had on-line capabilities. This is probably a reflection of the fact that a magnetic disk form data base for cataloging is of necessity large both in terms of numbers of records and in terms of number of characters per record. At least at this point in time it would appear that economic use of magnetic disk form cataloging data bases requires a significant amount of cost sharing (as is done, for instance at OCLC where some 58 libraries make use of the same data file).

The existence or lack of existence, of on-line capability in an automated system has a good deal to say about the nature of the hardware needed to implement the system. It also imposes some constraints on the software situation. Table 3 shows the use of assembly language as opposed to the use of higher level languages in the systems studied. The totals differ noticably from those given in the previous tables, primarily because a number of systems are implemented by using both assembly language and higher level language but also because information is lacking in some of the returns in both sets of counts.

Table 3

The Use of Assembly Code vs. Higher Level Languages by Time and Primary Function

	Acquisitions		Circulation		Cataloging	
	HLL*	BAL*	HLL	BAL	HLL	BAL
Pre	7	2	6	1	0	0
1970						
Post	8	5	2	4	6	6

*HLL = Higher Level Language *BAL = Basic Assembly Language

The pattern here is less clear than it was in the previous tables. Generally the trend is toward more use of BAL as time progresses. Summing across all systems, only 3 of the pre-1970 systems made any use of assembly code while 15 of the post-1970 systems used assembly code as compared to 16 of these systems using higher level languages.

As noted above, this increasing dependence on assembly code is a reflection of the increased use of on-line facilities. However, there are at least two other factors at work: with the spreading use of automation in the library field, more systems programmers are becoming involved in such applications and more librarians are learning about programming at deeper levels; in addition computer manufacturers are providing macros* of increased sophistication (particularly in the specifications of input-output functions) that make it easier to program in assembly code.

Generally, there are two main reasons for programming in a higher level language: it is easier (as measured by the number of lines of code necessary for a given function) to program, debug, and read in higher level language. This transferability of programs depends on the existence of national standards prescribing subsets which are theorically supported on all types of computers. The primary advantage of assembly code programming is that the programs run faster and cheaper. Speed is, of course, important in a production environment, particularly with linguistic data where there is more computer processing of each record.

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* macros: A statement which generates a sequence of individual machine instructions, whose use simplifies programming because it more nearly approaches a natural language statement of the computer process desired.

Of the various higher level languages used, COBOL and PL-1 dominate with COBOL being used in 14 of the systems and PL-1 in 10.

8. USE OF PHASE I SURVEY RESULTS, SYSTEM TRANSFERABILITY AND NEEDS FOR FURTHER DATA COLLECTION

The primary intent of the Phase I survey project was to collect data which would give the Library Systems Project a basis for selecting those libraries with the best mechanized capabilities. These libraries would be investigated further with the object of transferring all or parts of those systems to the California State Universities & Colleges.

The results of the survey extended beyond that objective, however, and included (1) a total overview, (2) trends in equipment and software development and (3) an extensive list of functions which can be used by those specifying requirements for a CSUC system design.

8.1 System Transferability

One subset of the data collected, system transferability, was found to be not clear. In most systems there would be considerable work involved, comprised of the following:

1. Place CSUC systems staff at library for an extended period to become familiar with the manual and computer processes.
2. Test programs on CSUC computer installation one by one. Make changes required to suit special requirements.
3. Prepare documentation for programs. When complete make final acceptance tests to complete transferral.

There were mixed responses on the willingness to provide the technical assistance necessary; the more reluctant being those with the smallest staffs.

During the interviews, several levels of system transferability presented themselves. We have defined these levels of transferability as follows:

1. Transferability at the operational requirement level, which identifies and adapts the services a library specified as requirements for its mechanized system development.
2. Transferability at the functional system process level means adapting the detailed computer processing functions performed by the systems probably by adopting the flow charts.
3. Transferability at the program code level, meaning adapting the coded programs themselves.

At the functional system process level, much knowledge and experience can be transferred without specifying a specific equipment brand or configuration. At the program code level the CSUC computer environment must be nearly identical to that from which the system is being transferred or there will be conversion problems.

8.2 Workshops and Committees

In addition to the survey, there are other data appearing in the form of emerging requirements. These data are forthcoming from the various Library System Project Workshops and Committees. It is assumed that these data will develop firm requirements with which to match capabilities found in the survey. Any requirements not matched will be identified for the final system design.

All the Inforonics, Library Systems Project Staff and Committee studies have resulted in a large amount of data. Any further data collection in the second phase of this project needs to be guided carefully. Drawing from the experience in the Phase I survey, one finds in any library site surveyed that there are many interesting techniques to be investigated and documented, often to no specific purpose other than general knowledge. Because these data are of technical interest, one tends to collect this data in greater amount than is needed, causing an excessive cost. Collecting too much data causes extra work in analyzing and compiling, again in excess of that which is needed.

At this time any further data collection work should be directed at satisfying specific project management needs. We see these to be:

1. Development of system specifications
2. Estimation of system cost
    a. Installation
    b. Operation
3. Projection of a system installation schedule
4. Estimation of personnel required
    a. Development
    b. Operation

In the Phase II project, the following seems to be needed to support the above listed project management functions:

1. Collection of detailed flow charts, commented listings, and sample products and equipment specifications.
2. Collection of additional data about system transferability.
   - a. Description of anticipated technical problems
   - b. Decision of the level of transferability to be achieved
   - c. Cost estimate of transfer
   - d. Projections of time required to transfer
   - e. Projection of people required to transfer
3. Collection of additional data describing potential system growth
   - a. Additional functions to be mechanized
4. Collection of additional data describing weaknesses of the system and possible improvements.

Given this general guidance, we are ready to proceed with the Phase II investigation.

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APPENDIX A

Overviews

SYSTEM OVERVIEW (ACQUISITION, CATALOGING, CIRCULATION)

LIBRARY A

Library A's system presently processes all accessions, and was put in operation in July 1971 without a parallel run. The system has an on-line (8 A.M. to 5 P.M.) central file of cataloging data which is referenced by several on-line indexes. These indexes can be constructed for any element in the cataloging record and presently author, title, call number, L.C. card number, book order number, vendor and series title are being used.

The central file is an integrated one in that all acquisitions, cataloging, and circulation control data elements are contained in it. Also records for all bibliographic forms, except rare books, slides and manuscripts are contained in the central file. There were some difficulties in the conversion of the retrospective data base which was done as several separate projects. For this reason the entire file has not been combined, and some final editing of the converted records is being completed.

The central file does not contain subject headings and other cataloging elements which are not needed in the indexes in order to save disk storage space. Such an approach allows the entire collection to be stored on three disk drives.

Input to the file at the acquisition and cataloging stages is by on-line keyboarding on IBM 274-'s, soon to be replaced by IBM 3270 CRT displays. The keyboard input, has an accompanying editing capability and runs on-line using IBM APL. This input creates workspace files. These files are transferred out of the APL workspace file into a form for entry into library processing system in a batch mode using programs developed by Syracuse.

The system performs a wide variety of technical processing functions, and more are readily available when their priority warrants installing them. Search in support of acquisitions is performed on-line. Data entry in support of acquisitions is performed by clericals from worksheets checked by professionals. The acquisition system prepares orders, claim notices (which are reviewed by staff) notices to requestors that an order has been placed, lists of delinquent orders, lists of cancellation notices. A cataloging record produced during this acquisition process is stored in the main file and is usable in the next phase cataloging.

The acquisition system has a program which prepares fund accounding reports on total quantities of material ordered, and also quantities by subject, and by type of material. Vendor time of delivery performance reports are also produced.

When the book is cataloged, the system is used to search the acquisition record. Revisions are entered into working space files on-line and merged into the central file on a batch basis. Punch cards for circulation control are produced by the system prior to book processing. Catalog cards are made for the main library only by manual means at the present time. In reference work, the terminals can be used to search main entry, author, title, series title, and call number. Subject search is by specialists from published reference works or from the card catalog.

The circulation system uses as data input a punched card, and the student I.D. card, sensed by a Colorado Instruments terminal. This data is recorded on magnetic tape, and processed into the central file on a batch basis.

The system is being improved so as to let the student charge out his own books. This is done by attaching a strip printer on-line to the Colorado Instruments terminal. This printer records the borrowing transaction, is torn off by the student and shown to the guard at the door.

The system produces overdue notices and lists of missing items. A system is planned to provide statistics on various aspects of the 350,000 volume/year circulations.

In addtion to the systems in operation several of the system policies and phases are worthy of note:

1. A concept needed to provide growth is to stipulate at the outset that the file design must be capable of accepting additional data elements if required in the future.
2. The future role of the library professionals will emphasize user service but this role will be integrated selection, reference, and cataloging control, as it is required to support their topical speciality. It is planned that with clerical assistance, plus the computer system, the professionals will be able to perform all of item functions.
3. Blanket standing orders have been substantially reduced and they are becoming more and more exclusive, to follow the philosophy of having library professionals perform selection.

4. In the future, subject access will be by methods and tools not generated in the library but used by the library professionals.

Future Investigation:

1. File operation and updating: The present integrated file and its indexes can be modified by both batch and on-line methods. The CPU effort required to update, needs to be studied to develop a figure for its ultimate cost and capacity.
2. The effect of adding subject access should be studied to see its effect on memory size and operating cost.
3. The extent and effect of multip.e matches obtained during search due to abbreviated entries should be further studied.

SYSTEM OVERVIEW (CIRCULATION)

LIBRARY B

Library B is a research collection of over four million volumes, serving a large and varied academic community. The central university collection is supplemented by 35 branch libraries in faculty departments and graduate schools. Technical services are centralized and current cataloguing conforms to Library of Congress cataloguing. Only the law and medical libraries perform their own technical processing function, due to their size and remote locations.

The approach to automation has been a conservative one.* The Library Systems Office was established in 1966, with an automated reserves system as its first task. The resulting system with minor improvements is still operational as originally implemented. Special projects include: production of book catalogs for some of the library's special collections, (done in MARC format); and a union list of science, engineering and medical serials. Input devices for these data have evolved from paper tape typewriters, to MT/ST's, to an IBM 2741 terminal.

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* Relatively autonomous applications programs for major subsystems have been designed and developed. These are currently operational and in production. Gradually, these modules are being integrated into a single processing flow beginning with Acquisitions and extending to a variety of user services, including cataloguing, material processing, and current bibliography generation.

Library B's circulation system followed the reserves system and remains distinct from it. Traditionally without book cards, the library continued this trend in the automated system, and each charge was keypunched with all book, borrower and loan information (although this sounds antiquated, one must note that the advanced on-line system of Ohio State University Library also requires keyboarding, both at the time of charge and cancel). The transactions and all daily cancels were submitted to the Computing Center each evening for a file update and a printout of all outstanding charges. A brief experiment with bar coding on borrower identification cards and book charge slips proved unsuccessful; the system is still in its early form but is being redesigned. The new system will employ Colorado Instruments terminals to read punched book and borrower cards and record each transaction on magnetic tape for file update and printout nightly. This configuration is scheduled to become operational in January 1973; the questionnaire refers to the present system.

Acquisitions was the next major procedure to become automated. The accounting module became operational in July 1969; the order printing in July 1970; and the full system was running in July 1971. For various reasons, serials are not ordered through the system, but all invoices are paid by computer.

Analysis of cataloguing functions began several years ago, but a full system is now in the stage of redesign at the program coding level. Library B has worked with the MARC tapes: searching to produce proof sheets and book selection assistance is done, and statistics are kept. (Nothing is weeded from the MARC file. Juvenile literature is retained for potential use by the Teachers' College library). Printed indices based on the order file have been produced regularly since 1969. A full-scale automated current cataloging system has been designed, but a change of personnel forced a delay and later a decision to redesign. At present, the intention is to treat cataloguing in two phases: (1) card production, and (2) authority and bibliographic files. Implementation is scheduled for January 1974. With the cataloguing system up, efforts will turn toward the smooth integration of the three major systems, which even now have a large degree of interaction.

For general trends, the Computing Center has acquired WYLBUR from Stanford University, making on-line processing more feasible. The bibliographic data for smaller special collections has been input on-line, using 2741 terminals. The library administration is interested in automation and in reader services. Library B, as a result, has been working with the New England Research Applications Center (NERAC) and the Illinois Institute of Technology Research Institute (IITRI) on a limited basis, and subscribes to the census tapes service offered by Dualabs.

The tendency seems to be moving toward the establishment of a social science information center, based on a survey of data base users.

SYSTEM OVERVIEW (ACQUISITION, CIRCULATION)

LIBRARY C

Library C has three automated systems: circulation control, acquisitions, and serials. The serials system is a holdings file of their 30,000 records, and will not be described further in this report.

Circulation Control

The library moved into a new building in October 1968. At this time, the batch circulation system began operation. During the previous year when a book returned from loan to the library, a punched IBM book card was keyed and placed in the book. When it was judged that the core of circulating books all had cards, production of book cards for new books was undertaken. This procedure provided 80% of the first month's circulation books with punched book cards. Each book has a master book card which is duplicated and verified to make the book card. Whenever a book card is lost, the master card is again duplicated and verified.

The 80 character book card carries the following data: transaction code, location code, call number, language, media, author (10 characters--8 for last name and 2 for initials), and title (28 characters--of which only 10 are transmitted in a circulation transaction). The 80 character transaction record includes all the book card information, except fewer characters of the title, and patron identification number, patron status, time of day charged, terminal transmitting, and date due.

Books are charged out by the circulation staff. Each student must have his embossed and punched identification badge which is good for four years, and a current validation card, which is issued upon payment of tuition. The charge out device, an IBM 1030 punch card and badge reader, requires both the borrower badge and the IBM punched book card. Faculty, however, may check out books without their identification cards. Special cartridges are inserted into the IBM 1030 instead of the borrower badge. If a book does not have a book card, it is charged out manually, and a book card is produced upon its return.

There are two catagories of borrowers: patron and non-patron. There are different loan periods depending on the patron's status, e.g., under-graduate, graduate, faculty, staff, special patron. Non-patron loans include items at the bindery, missing items, items on reserve, and items being repaired.

The circulation data from the IBM 1030's is batch processed via a remote job entry station which uses a Honeywell 316 mini-computer as its CPU on the university computer, two PDP 10's in dual processing mode.

The Honeywell 316 is used to generate an LC Call number ordered circulation list three times a week, overdue slips once a week, and circulation statistics including number of volumes by type of material, by type of borrower, and by subject class.

In-Process System

The in-process file consists of all items on order, received and awaiting cataloguing copy or circulation cards. The in-process record is created after the decision to buy has been made. The order data is input on a flexowriter with an attached keypunch. The next day order forms and 4 punched cards for each order are ready. These punched cards are used for accounting; to enter the item into the in-process file; and to change the status of the in-process record (on order, received, cataloged). Two cards are produced for the latter--one goes to the vendor, hopefully to be returned with the item, for easy identification. If it is not returned, the spare is used for status update. Author, title and fund in-process lists are produced weekly. There is also not an automated in-house cataloguing system, OCLC has been used on a pilot basis for catalog card sets. If this does not continue, some other means of obtaining automated cataloguing must be developed.

Equipment

The library has had an unfortunate history of machinery. The circulation system was originally specified for the University computer center's 360/50's. However, the computer center informed the library that it could not handle the library processing demands. At that time, the library had an IBM 1130. A hybrid system was devised using the IBM 1130 and the several IBM 1030's. There were difficulties becoming operational, and in the meantime the university computer center decided to rid themselves of the 360/50's and install two PDP-10's on a dual processing basis. The library was informed that the University computer center would begin running the library programs as soon as they were converted to the PDP-10's. After the necessary re-programming, both systems are now on the university equipment, which includes the following equipment:

- PDP-10 System A
    - 1 swapping drum
    - 4 magnetic tape drives
    - 6 disk drives
- PDP-10 System B
    - 2 swapping drums
    - 8 magnetic tape drives
    - 15 disk drives
    - 2 card readers
    - 1 card/punch
- 4800 Baud data pump
- Computer RJE station:
    - Honeywell 316 minicomputer
    - Mohawk card reader
    - Mohawk line printer
    - ASR 33 teletype console
    - Univac VIP card punch
- 9 IBM 1030 Badge/Card reader
- 1 IBM 1034 High speed card punch
- 1 IBM 1032 digital time clock
- 3 flexowriters
- 3 IBM 029 keypunches

In the near future, the library hopes to have the acquisition and circulation system on-line with interrogation capability. Also, the computer center is planning to install a microwave communication system for data transmittal, but will probably use it only for "public" terminals.

SYSTEM OVERVIEW (ACQUISITION, CATALOGING)

LIBRARY D, E

Libraries D & E have in operation three systems:

1. An integrated acquisitions and catalog card production system (BCL -- Books for College Libraries) set up in June 1970 to purchase and process materials, acquired with the special supplementary funds alloted by the state, for the 29 state college libraries.
2. An internal acquisition system (BOSS -- Book Ordering and Selection System) which has been in operation since August 1969.
3. An internal catalog card production system which has been in operation since August 1970.

The BCL Integrated Acquisitions and Catalog Card Production System

This system was set up originally to acquire and process books purchased through special state funds alloted to the state college libraries to strengthen their basic collections. It is presently used to select, acquire, and process books bought through additional supplementary funds alloted to Library D & E and the 29 state college libraries.

MARC tapes (reduced to the simplified format) are used to prepare selection lists for the 29 libraries. Orders for the selected items are then printed using the MARC tapes to supply the bibliographic order data. Orders for items not on MARC tapes are also accepted. If cataloging copy can be found for these items, it is input and orders printed from it. Catalog cards are printed when the book is ordered for all items with catalog data on the file (MARC or original input) and await receipt of the book.

The system is partially on-line and partially batch. The active on-order files (about 75,000) are kept on-line and may be searched by order number, LC card number, author, or title. Routines to search by ISBN number are being added. The bibliographic store (about 455,000 records including MARC records, local input, and Able's "MARC-I like" records for "Books for College Libraries") is kept on magnetic tape and may be searched (batched process) by LC card number, local accession number, and in the near future by ISBN number. Searching the on-order file and requesting catalog cards are the only operations performed on-line. Fund accounting is not extensive, covering mainly number of titles, number of volumes and expenditures for each school.

Hardware

Hardware to run Library D & E's system includes:

1 IBM 370/145

9 IBM 2260

1 IBM 1053 remote line printer

2 IBM 1403, high speed printer

1 IBM 1403, low speed printer

1 IBM 2540 card reader-printer

7 IBM 3420 magnetic tape units

    (5 Model 3, 9 track P.D 800/1600 BPI
     2 Model 5, 1600 BPI)

1 IBM 2319 AI disc drive with IFA

1 IBM 2318

1 IBM 2314 Al

    (A total of 14 drives)

14 Disc packs (plus misc. scratch and work packs)

1 IBM 2848 control unit with data set

4 IBM 029 keypunches

1 IBM 1050 system for printing labels

Batch jobs require a minimum core of 84K. The teleprocessing system requires 112K.

Hardware costs are not available. Unit costs are 90¢ a volume if developmental costs are included and 60¢ a volume if developmental costs are not included. Card sets are 20¢ a set. The project involved 1 systems analyst, 2 programmers, 3.5 professional librarians and 10 clerk/typists.

The costs claimed are indeed low but should not be attributed solely to the efficiency of the computer processing system. A number of other factors affecting the cost picture:

1. It is a standardized service -- no variations in processing for individual libraries.
2. Cataloging copy is usually available.
3. LC cataloging is accepted without adjusting for so-called "local needs".
4. The manual processing procedures as observed by the interviewer were efficient and well integrated with the machine processing routines.

If high volume and low turn-around-times can be taken as indications of a smooth-running operation, this appears to be a good one. 650,000 volumes have been processed in 2 years. 70% of the items are processed 1 day after being received. With the exception of a few unusual snags, the rest are processed in three.

Internal Acquisition System: BOSS (Book Order and Selection System).

This system processes 90,000 monograph titles (110,000 volumes) per year performing the functions of ordering, claiming, fund accounting and reporting vendor performance. The on-order active files are kept on-line. Received and processed orders ("history file") are kept on magnetic tape. Searching and receiving are presently done on-line but receiving will probably be changed to a batch operation.

Internal Catalog System

This system produces catalog cards and labels for items ordered through the internal acquisition system (BOSS). The cards produced are sorted by catalog and then alphabetized.

The catalog data base contains MARC records reduced to an internal format, and records for items not on MARC tapes that have been processed through this system since it began (August 1970). It also contains records for items ordered but not received for which MARC records were not expected and LC cataloging copy was available at order time. This file is on magnetic tape and is searched daily by LC card number, local accession number, and soon by ISBN number.

Since the operation of the automated internal acquisitions and catalog system, the clerical staff in the acquisitions and catalog departments have been reduced by 14, catalogers have been reduced from 12 to 8, and file clerks have been reduced from 8 or 9 to 4 or 5. It takes about 3-5 days for most of the material ordered to get through the catalog department.

SYSTEM OVERVIEW (ACQUISITION)

LIBRARY F

Library F is a large research library with a long history of involvement in library automation. The development of a computer assisted cataloging and information retrieval system was initiated in 1963 as a cooperative project of Library F's medical library and two others. By 1967 a second version of this system was in operation at F's medical library. The system ran quite successfully for four years providing excellent services at a slightly higher cost than an equivalent manual system. In 1971, the combination of severe budget cuts and of the necessity for major redesign to accomodate the increased file size lead Library F to discontinue the automated catalog system, Presently, Library F has an automated system which monitors all of technical processing, but which for this report has been termed an acquisition system.

HISTORY

Library F began the design of its acquisition system in 1965; the initial portions of that system were implemented and became operational in 1966. It ran in batch mode on an IBM 7040-7094 Direct Coupled System (DCS) computer and was coded primarily in the MAD (Michigan Algorithm Decoder) language.

In June of 1972 a revised version of the acquisitions system became operational. The revised system is in essence an upgrading of its predecessor. This upgrading involved no radical change in the manual procedures associated with system utilization; for most purposes the upgrading this was transparent to library users, except that the timeliness and scope of many reports was improved. The upgrading, however, did entail total redesign of internal (machine) processing, file structure, etc. Library F estimates that the rewrite took upwards of seven man-years expended across a period of two calendar years.

The revised acquisitions system has all of its program code (re)written in PL/1 level F. The system ran successfully for two months on an IBM System/360 model 67 before being converted to an IBM System/370 model 155, on which it presently runs, still in batch mode.

DESIGN PHILOSOPHY

Design scope is defined to include major unitary acquisitions functions. Serials, excluding monographic series, are not included except for initial purchase. Individual monographs in series are handled by the system with no special treatment, other than the inclusion in the record of a descriptive series note. A unique characteristic of the system is its emphasis on the monitoring of the flow of materials. IBM 357 data collection devices are used at various stages of processing to record the status and location of an item. This monitoring satisfies the requirement to know the location of each of the approximately 75,000 items that at any time have been received and are being processed.

The original system was implemented in stages, originally controlling only the ordering of materials, but now extending all through technical services. As an indication of the increased scope of the system the in-process file, which was estimated originally in 1965 to attain dynamic equilibrium at 20,000 records (representing items both outstanding and received), now averages four to five times that many.

Machine control begins when an order is written, and ends when the acquired item (a) has been completely processed into the collection and (b) has been paid for or otherwise disposed of financially. Using IBM 826's, typewriters coupled with keypunches, a seven part order form is typed while selected data is collected on punched cards. The seven part form provides two copies for the vendor plus five copies to accompany the item through technical processing and to file as temporary cataloging where needed.

UNIQUE FEATURES OF THE SYSTEM

In addition to the use of data collection devices for process control, the system produces on computer output microform (COM) two separate and complete in-process lists: one by author and title, the other by control number. Extensive study of possible microfilm viewing devices was done before choosing the Northstar 1. Even so, these machines initially proved troublesome and faulty, until the film transport and film gate were redesigned. The machines are no longer any problem. Workers at each location were given their choice of positive or negative microfilm. Most preferred positive microfilm. There are currently eleven microfilm viewing devices in eight separate locations distributed among four buildings of Library F.

Library F has unique relationships with their blanket order vendors. Some send to the library a copy of their catalog indicating which items will be sent to Library F. In-process records are immediately created for these items in anticipation of their arrival, thus avoiding check-in delays when the items arrive and reducing the probability of initiating a duplicate order unintentionally, as well as allowing computer-initiated vendor claims, if required.

Other unique aspects of the system include:

1. checking for duplicate orders on the basis of a search code automatically generated from author and title.
2. on-demand reports of outstanding commitments or expenditures by fund.
3. parent-child linked record scheme for receipt and invoicing of partial shipments.
4. the cataloging back-log is included in the in-process file, so that "what" and "where" is known to staff and patron alike.

SYSTEM OVERVIEW (ACQUISITIONS)

LIBRARY G

The Library G has three automated systems in operation:

1. A payroll system for its 1100 employees. The system produces time cards, pay checks, W-2 forms, and various reports. Except for hardware and costs, this system is not described in further detail in this report.
2. An automated labelling system for the library's service to blind program. The data file for the 9000 blind readers is stored on disc and contains names, addresses, codes for types of material to be sent. Labels are produced weekly for the readers who are to receive materials. Plans are to extend the system to include selection or scheduling functions. The system would then record what material had been sent each borrower and automatically match materials with borrowers. This system will also not be described further except for the hardware and costs.
3. An automated acquisitions system. The rest of this report will be concerned mainly with this system.

The automated acquisition system has been in operation since February 1972 replacing an IBM 360/20 batch system. Orders are produced from records input locally. Both the input and receiving operations are done on-line. The computer system assists the input operator by supplying the tags (or names) of data fields to be input. The on-order file is on-line and may be searched by order number or an author/title code. In addition to printing orders and claims, the system prints the checks to be sent to the publishers and vendors. The system does generate branch location and fund expenditure reports on demand.

The system provides "in-process" control information on where materials are in-house at any moment. It will also produce lists in order by the length of time items are in each department to serve as a management tool for the Director of the library. Lists of items on-order are available for the branch libraries. These will probably be issued on a quarterly basis.

Two mini-computer systems are presently in use--one for the ordering/receiving operation and one for the payroll and services to the blind operation. Each system contains a central processor, 2 removable cartridge disk drives with a total capacity of 8 million characters, printers, keyboard, and instruction light panel.

A total of 22 single platter disc packs are presently being used for the various processing operations.

The operations are actually in the start-up phase and unit costs are not yet available. The purchase price for both the hardware and software was $57,000 per system. Maintenance costs are $2400 per year per system. The two systems are run by 5 clerks.

Plans call for automating circulation control and the booking or scheduling operation for audio-visual materials.

The automated systems at Library G are of special interest in that:

1. The system uses small computers ("mini-computers") owned by the library and totally dedicated to the library operation.
2. The library bought the systems on a ready-to-use basis. (Both hardware and software were purchased as a package from Computer Library Services, Inc., Waltham, Mass.). The expense of having in-house data processing staffs is prohibitive for most libraries. Cooperative arrangements with other libraries as exemplified by the many networks and consortia existing today are attempts at solving the problem. Purchasing a "package" represents an alternative solution.

SYSTEM OVERVIEW (ACQUISITION)

LIBRARY H

Library H is a book ordering-processing center for libraries in the state of New York. In June 1972, it initiated a pilot operation servicing 15 branches of the Brooklyn Public Library. It is projected to eventually service 1,000 libraries at a production rate of 2.5 million volumes a year. At present it generates forms and lists for the libraries to use in the selection0ordering process, orders, on-order/in process lists, catalog cards and labels, and fund accounting reports.

Bowker tapes for "Books in Print", along with their monthly supplements, are converted to the Library H format and constitute the major part of the data base for the acquisition system. Library H creates their own record for items to be ordered that are not on the Bowker tapes. At present all data for catalog card production is input by Library H but plans are to receive machine readable catalog data from the New York Public Library. (The NYPL data base contains the MARC file.)

The On-Order file contains only the non-bibliographic order data, e.g., price, fund, etc. The bibliographic order data, e.g., author, title, publisher, etc., is kept in the Book Master File. This Book Master File contains the bibliographic order data from the Bowker tapes plus Library H input. When Library H catalogs an item, the datalog data is appended to the record for the item in the Book Master File. The libraries owning the item are also indicated in the Book Master File.

The Book Master File is on disc and may be accessed on-line by LC card number, ISBN number, a library accession number for the item, and the process control number for the item. Author and title listings of the bibliographic order data are kept on microfilm for author and title look-up's. The catalog data segment of Book Master File record is not accessed on-line.

The receiving operation and requesting catalog cards are performed on-line. All other processing is batched.

Library H's present hardware includes:

1 IBM 360-40 Processing Unit

2 IBM 2260 Display Terminals

1 IBM 1053 Printing Terminal

1 IBM 2740

1 IBM 1403 N-1 Line Printer

1 IBM 2540 Card Reader-Punch

2 IBM 2401 Tape Drives

1 IBM 2314 Disc Drives with 8 drives and 1 spare

15 Disc packs

1 IBM 2701 Control Unit

1 IBM 2848 CRT Control Unit

1 Mohawk key to tape input device

1 128K Fabritec Memory Unit

Programs are written in Assembler language.

System development costs thus far are estimated at $2,500,000. Of this, about $1,000,000 has been spent to develop the computer system. A sizeable portion has been spent to develop the materials flow system. The conveyor system projected will cost about $300,000. Library H's staff stress the fact that the system has been designed for a high volume operation and will only be economical at the projected 2.5 million volumes a year level.

Processing charges to libraries will probably be $1.60 a volume. Cost projections have been made for the eventual system. The staff is checking to see if this report can be made available to this project.

SYSTEM OVERVIEW (ACQUISITIONS)

LIBRARY I

Library I is now the development center for CAPTAIN (Computer Aided Processing and Terminal Access Information Network). This system is designed to handle the technical processing for the New Jersey State Colleges. Eventually, the center at Library I will become the receiving and disbursing facility for books and other materials.

CAPTAIN is a result of a request by the state academic libraries for additional computer support, and of a study by the Department of Higher Education which indicated that each library needs approximately $250,000 per year to enrich their collections. The state collection were skeptical about their ability to handle the enlarged technical processing load. It was therefore decided to establish a central technical processing center and a central computer center.

Specifications for the proposed system were developed during 1970, and 1971. IBM, the lowest bidder, won the contract. The initial sum to IBM was $90,000.

The machine configuration will include an IBM 360/67 simplex computer linked to a remote IBM 360/20 computer. Access will be through typewriter terminals, at present IBM 2047's, located at each state college.

The acquisition operation has been operational for two months. The machine record is created after the title has been searched in the in-process author and title lists. The author list is not a main entry list but a list of all possible authors. Thus the problem of establishing a main entry before the actual item is received is eliminated.

The in-process file is an indexed sequential (ISAM in IBM lingo) file stored off-line on disk. ISAM records must each have an access key. In this case, the key is a 22 character alphanumeric made up of the LC card number of the ISBN number, ordering library code, and copy number. In the event there is no LC card or ISBN number, as is often the case when ordering, a local control number in the ISBN format is made up of the Julian date and a sequential order number. Once the key is constructed it is not changed although LC card numbers and ISBN numbers are found later. There is also on-disk an index for purchase order number to the appropriate key. Each book ordered has a unique purchase order number. This index and the author title list give multiple access to the in-process file.

Order Form Production

If the title to be ordered is suspected to be on MARC, a "short" order is keyed. This includes at minimum an LC card number, and additional, any other data to supplement MARC. The day's "short" orders are batched and run at night against the MARC file. Order forms for those matching MARC records are produced. A list of all records searched is also produced telling which records matched MARC and which did not. These non-matches will be run against subsequent weekly MARC supplements. However, the order department will not wait for MARC, but will search for bibliographic data for all MARC non-matches as well as those items never thought to be on MARC. Full orders for MARC non-matches and non-MARC records are keyed. The in-process record, be it originally short or full, is at most 240 characters and consists of title, up to nine authors, editor, publisher, dealer, special information, notes to catalogers, destination of book if different from ordering library, LC card number, ISBN, purchase order number, date entered on file, status of record, date status set, action code for status, estimated price, actual price, action code for price, dealer code, publisher code (if not ISBN), cycle time for dealer, accounting code, fund code, and priority tag (e.g., rush).

When the books arrive, the records on the file must be accessed. Approval plan books which are not intentionally in the in-process file are input for the first time with the book in hand. If the original purchase order is returned with the book (one purchase order is generated for each copy of a title purchased), the task is a simple one--key in the LC card number or ISBN found in the book, or the purchase order number. These numbers do not retrieve the record, but form the key to access the record in the nightly batch processing. If none of the above numbers are available, the author-title indexes can be checked. Once the key or access data has been determined, the invoice data may be keyed. The presence of the invoice data record in the nightly job stream causes the in-process record to be updated with the invoice data and the status code and 'data status entered' fields to be changed. Finally, in the nightly run, verification copy is produced for the cataloging department.

Cataloging non-professionals review the verification copy. They can then return to the terminal and key a correction to the in-process record. The cataloging system is now under development so catalog cards are still produced manually.

That IBM played a major role in the development of this system both as the supplier of the hardware, and as the software expert means the system will be well documented, the hardware environment will not be difficult to reproduce, at least for the next few years, and the final programs will be transferrable.

The system employs a mix of on-line record input and editing capability, with batch and off-line update of the in-process file and production of order forms, claims, fund reports, and verification proof copy. The off-line in-process file is, however, accessible by means of author-title lists, which can answer most questions of an order, where is it, from whom was it ordered, when, etc. These necessary questions are answered by lists which many librarians prefer, without the cost of maintaining an on-line file and without the cost of the CRT terminal rental, and without the extra load on the computer of several CRT terminals.

Invoice information and dealer performance data are provided weekly by the fund accounting subsystem.

The system has been operational for only two months and all libraries are not yet on the system. Future plans are to get everyone on the system and let it run for six months or so, at which time there will be a general review.

Library I has their own circulation system which has been in operation for three years. Included in the system are all types of materials that have call numbers and that can circulate. Some branch libraries are not in the main library's circulation file, but in self-contained subfiles. The system is presently running on a 360/30 (DOS) for the main library, and two branches. Library I has recently installed the system on a 360/67-OS for Stockton College library.

The book card is an IBM punched card. The original book cards were made from the shelf list. The borrower card is a punched plastic card. The files are off-line on magnetic tape. The books are charged out on IBM 029 keypunches. Two punched cards are made at charge out: one, a discharge card for the book, and another duplicate card to record the charge out in the circulation file. Date due slips are manually produced and inserted into the book with the discharge card. There has been no problem with long delays at the charge-out stations, although keypunchers are not very fast.

Lists are produced five times a week by an extended call number (i.e., call number, copy and volume numbers, library identification, collection code, and media code). Included at the end of these lists is management information for number of volumes by library, by borrower type, by recalls, by renewals, by charges, by discharges, and by overdues.

Library I and other state schools are happy with this system. No major revisions are planned for the near future.

SYSTEM OVERVIEW (ACQUISITION, CATALOGING, CIRCULATION)

LIBRARY J

Library J has on-line acquisitions, cataloging and circulation for both monographs and serials. All processing is done on the university 370/135. The circulation system began operation when the library moved to their new building in January 1970. This system is well documented in both the Larc Reports (Volume 3, Issue 4) and the Journal of Library Automation (Volume 5, Number 1) March 1972, "An Interactive Computer-Based Circulation System Design and Development" by James S. Aagaard, p.3-11.

Data Base Format

The acquisition and cataloging data base is based on the MARC II format. Modifications to the MARC II format are:

1. MARC has three-character tags with two indicators while Library J's tags are two-character tags, with three indicators. The third character of the MARC tag has become the first indicator.
2. Library J's local data fields include: call number, internal data (processing notes), order data, payment data, related records, volume holdings, action date, bindery specs, bindery ticket.
3. Library J's local MARC records do not have the FFD data field.

MARC II data selected cataloging is reviewed by a "fast cataloger" (non-professional) with the book in hand. Any necessary modifications are noted on the worksheet. Clerk-typist correct the record on the terminal by re-keying the entire field, check their keying, and ask for catalog cards, labels, and the book card.

Catalog Copy Input Procedures

Cataloging copy for records not likely to be on MARC is keyed at order time by the order/search department. All cataloging copy both MARC and local is reviewed by the catalog department when the book is received. There is no worksheet for local MARC, but a Xerox enlarger makes copy very easy to read. The cataloging department tags the record, and typist key the tags and the data.

Subfield codes are not keyed, although delimiters in their place are. For example:

IM New York,/McGraw Hill,/1972.

The programs convert the data field to:

IM /aNew York,/bMcGraw Hill,/c1972.

If a subfield were missing, a double delimeter is keyed, for example:

IM //McGraw Hill,/1972.

The most common tag within a group of tags need not be made explicit, but is assumed as a default condition for which the programs add the appropriate codes. For example, main entry personal name single surnames (MEPS) is the most common main entry, so only ME with no special indicators is needed to identify it.

These two procedures take advantage of the computer capabilities and relieve the library personnel.

Terminal Language

The terminal procedures language is very simple and easy to learn for all activities. Student aides in the library can be trained in 15 minutes to query the circulation file and display the record. More difficult procedures, for example saves and renewals, are learned within a few days. The order and cataloging procedures for monographs can be learned in a few days. The serials records pose more problems not in searching, but in verifying the correct record. This is due to the nature of serials, not the terminal procedures.

The major problem with the terminals is the time necessary to print out the necessary data. This can cause serious delays in the serials check-in operation, for often more than one record must be printed before finding the correct record. To solve this problem, Library J is planning to switch to CRT terminals so that the entire record may be displayed quickly, and also with reprogramming editing will no longer require keying the entire field, which, especially for serials holdings data, can be quite long and complex.

Philosophy

Library J believes that their old manual procedures were not only inadequate to the tasks but soon to fall apart completely. Automation in the library is intended to replace these inadequate procedures and provide better services to all library patrons. This has already proved to be the case in at least two areas.

The circulation system began 2-1/2 years ago when the library moved into their new building. Circulation cards were made for all books which would circulate. The process of putting the book cards in the book proved very useful as an inventory. Of the 700,749 book cards just over 20,000 discrepencies between the shelf list and the books on the shelf were found. Joseph T. Paulukonis describes in some detail creation of book cards in the Larc report. Since the circulation system is so automatic and easy for the patrons to use, the circulation staff has had more time to follow-up on missing items in a regular manner, and to answer patrons questions on the status of books. Thus without reducing the circulation staff, automation has enabled them to give better service.

The serials portion of the technical processing system begun with student help keyboarding (on-line) the entire serials shelf-list. Then worksheets were produced for each Kardex tray. A serials cataloger compared the worksheet and Kardex record to update and correct the holdings information in the machine record. Once this update from the Kardex record was done, serials check-in for the title began on-line. When a volume is completed, another worksheet is produced. This time the cataloger reviews the cataloging with the bound volume in hand to add subject information to the machine record. After these corrections, new cards are produced, including a shelf list. This three-step process has allowed Library J to continue processing while gradually converting the serials data base.

SYSTEM OVERVIEW (ACQUISITION AND CIRCULATION)

LIBRARY K

Library K has had an acquisition system in operation for 8 years. Initially, it was a punched card system which 4 years ago was converted to magnetic tape. It is unique in as much that it has 96 character format on the Univac 1005, a machine which is no longer maintained by Univac.

It was redesigned to fit on the 80 character card and run on a Univac 9400 but the redesigned system has yet to be placed in operation. The system is a cooperative that offers to its member libraries, as one of its services, the ordering and processing of books. A unit cost of 30 cents covers only the cost of supplies used in acquiring, cataloging and processing the books.

The turn-around is rapid. The center attempts to catalog as many titles as possible as soon as orders are received from the Library of Congress "News Set" service. They print catalog cards by an offset process and store them. When the books arrive, they process the groups of titles, keeping the titles together until the last stage at which time they are broken out in batches by library for shipment.

This processing of single titles is one of the ways the system operates at low cost because the same cataloging effort is spread over multiple copies.

Library K's member libraries do their own selection. They may use any selection tools or sources for their orders including buying lists issued by the Center's age-level consultants. Upon selecting a title or titles the libraries fill out a card which is sent to the center. The center keyboards a card and writes it on mag tape. They use the mag tape to generate an order printed on the 1005 computer. On receipt of the book, the information is keyboarded into a machine record. The book passes through a fairly extensive and well organized manual system. The manual system puts book pocket labels, spine labels and cards in each book. The libraries' order code identifies where they want the various labels to be placed. They also make labels for a circulation system which is supported by the center. These manual processes insure that many books are shipped to the customer library within two days of its receipt. This rapid turn-around is appreciated by the customer libraries.

The system operates in a batch mode with no provision for on-line searches. The batch system does, however, supply notification when books have been ordered for lengthy periods of time and not received. In this situation the system produces a print-out for human decision and action.

Generally speaking, although the system is old, it runs very smoothly. It provides a very good service for the libraries of the county.

The center also provides a circulation system which is only used by four of their libraries. It is a once-a-week batch system which provides listings of overdue books.
The circulation system was implemented on the Univac 9400. It uses an 80 column card as opposed to a 90 column card. It is

presently implemented for the four libraries run on a batch basis once a week. It consumes approximately 20 hours of computer time leaving a lot of time for additional libraries.

The system has been in operation for approximately two years. It uses two "Desitron Readers" which read cards but also have keyboards for manual input. Each of the libraries in the system has from 1-3 readers.

The book card is a punched IBM and the borrower card is a plastic credit-card type. The system allows for three types of check out: adult, young adult, and juvenile. The terminal allows for key in and the event that the borrower does not have his card or the card cannot be read. The circulation system basically provides for the needed printout, i.e., overdue notices. It does not attempt to do management data analysis.

Both systems appear to be run very efficiently with minimum technical support. They have only one computer operator and one systems analyst-programmer set-up man. The whole operation employs approximatley 80 people. The total production purchases and processes 350,000 titles a year, and handles circulation for 4 libraries and also performs payroll processing for all the county libraries.

Much of their cost effectiveness is due to the fact that they use a small 1005 Univac computer which they own. The second system, the new generation system, is a Univac 9400, which also is a small, low cost system.

SYSTEM OVERVIEW (CATALOGING, CIRCULATION)

LIBRARY L

The automation program at Library L has taken place in the last three years, a period in which the library has grown several hundred percent in collection, size, and space occupied, the staff has increased (over a five-year period) threefold, and the collection has been reclassified from DC to LC.

Three major activities have been mechanized by an on-line system developed at Library L: reclassification of the library, cataloging of current material, and circulation control. The system combined existing interactive programming in the form of an ATS/360 system with such in-house programs as were necessary to perform the library data process functions needed.

RECLASSIFICATION AND CATALOGING OF CURRENT MATERIAL

The following procedure is used to create a catalog data base from new titles and titles being reclassified:

> L.C. catalog cards were typed and stored into the ATS/360 System. The inputting was not required to be done in any specific sequence. Proof sheets are run for each days work in document number order. Master records are filed in document number order. Corrections to be made are set aside.
>
> When the inputting of the batch (approx. 4,000) of master records is completed, the corrections are made from the proofsheets.

After all corrections are done a "complete edit" is run on the batch. The ATS operators make any necessary corrections and the edit is re-run. This cycle continues until the edit is "clean", i.e., no errors are found.

The Computer Center produces the labels, pockets, book cards and document number order list (2 copies) for the batch.

The books are labeled and put on the shelf. The Master Records for the batch are kept on-line while the books are labeled and any errors found are corrected. The book catalog for the batch is produced.

After all labeling and corrections are finished, the edit cycle is repeated until the batch is "clean" or free of errors.

The batch is transferred from ATS storage to magnetic tape. The short record called the Circulation Book Record File is built for use in the on-line circulation system.

Catalog cards are produced for the batch for interfiling in the union catalogs.

CIRCULATION

The on-line circulation system of Library L was planned and implemented as a by-product of the reclassification project. Selected bibliographic information concerning the books was extracted from the master record file. All manipulation of the bibliographic information was handled by computer programs.

A primary objective of the computer center's approach was to avoid duplication of files. As a result of this concept, the circulation system was integrated in file usage with the registrar's student master records and with the business office payroll master records. Both the student master records (SMR) and the payroll master records (PMR) are on-line. Index files have been developed to gain access to the SMR file and the PMR file in two ways: (1) by social security number and (2) by a name search key consisting of the first three characters of the last name plus the first character of the first name. The later character is optional.

Security of both the SMR and the PMR file is provided through computer programs. The information pertinent to the library circulation system is all that is displayed to the library staff. The library staff is not permitted to perform the same on-line activities and transactions with the SMR and PMR files as the Office of the Registrar and the Business office. The complete student records and the faculty/staff payroll records, therefore, are not available to library personnel but may be accessed only by specified terminals located in business, student affairs, and registrar's office. In like manner, the Registrar and Business Offices are not permitted to access the library files.

Security of the CBR file (Circulation Book Record File) is also provided through computer programs. The terminals located in the public areas of the libraries are not permitted to access the name and address information of the borrower of a book but can only determine whether or not the book is checked-out. The terminals located in the staff areas are permitted to access the full circulation book record.

DATA COLLECTION AND INQUIRY

The CBR file is maintained on-line at all hours the library is open. Since use of CBR is so closely integrated with the SMR and PMR files, these also are on-line for library hours. The IBM 1031/1033 data collection terminals are used to charge-out and check-in books and the IBM 2260 visual display terminals are used for inquiry of the status of books and patrons, as back-up for 1031 charge-out and check-in, and to search for the name or address information of patrons.

The visual display terminals are available for student and faculty use in locating materials. These terminals are very popular since the Helm-Cravens complex is spread over ten floors in two buildings and the use of the terminals saves a great deal of footwork and time if the books are already checked out. The students and faculty inquire by the document numbers located on each catalog card and in each book catalog entry. In fact, many users record only the 6-digit document numbers from the catalogs, check these numbers on the terminals, and then record the call numbers only for those books available.

FUTURE EXPANSION

It is intended to expand the system to include author, title searching as soon as disk storage is available. An acquisition system design and implementation plan will be developed in the next twelve months.

SYSTEM OVERVIEW (CIRCULATION)

LIBRARY M

The Library M circulation system is one of the most advanced systems currently available. It is an on-line system with some 50 terminals in the various libraries and branches about the campus. The entire shelf list was converted at one time and put on-line. Items may be found by author search, title search, author-title search, call number search, or ID number search. Author and title variations use simple search codes making use of the first four or five characters of the appropriate word. Response is rapid and permits modest paging through the store to help with ill defined keys.

As the entire shelf list (1,000,000 titles) is on-line, the system is not only used for circulation but also for catalog searching by author or title. Thus a user can call into the library switchboard and request information about a book, starting with an inquiry as to whether the book is in the collection. If it is, the operator can also advise the location of all copies and which, if any, are available for loan. Assuming the latter, the library will deliver to office or dormitory within 24 hours. This high user orientation has led to 15% increases in circulation each of the last two years. Costs are up, but because of the increased circulation, cost per item circulated are now estimated to be very close to the 38¢ per item which was obtained before the system was installed.

Since books can be ordered by phone (and renewed for that matter) no book or borrower card is used in the system. Even if the user is present with the book at the circulation desk, the book and borrower ID numbers are entered manually through a keyboard. (It should be noted that stacks are closed to students.)

Fine payments are entered through the same keyboard system. Fines are calculated automatically. The borrower file is also used for student parking tickets and other services though it is not presently totally integrated with other university data processing functions.

Other library systems have inquired as to the availability of the system and Library M is willing to make the system available. It is presently being implemented in a multi-university state network.

SYSTEM OVERVIEW (CATALOGING)

LIBRARY N

The N library center operates an on-line/off-line cataloging system and an on-line union catalog for some fifty libraries in the state. The data base is MARC plus shared cataloging records produced by various librarians within the system since the inception of the system. As of early April 1973 approximately 597,000 unique records were available within the system. As of this same date, the on-line union catalog contained locations for 927,730 copies of books. Negotiations are underway to add the University of California Supplement data base to the system, though the size of the latter file is such that it would probably be made available only on a delayed basis.

On entering into the system a library specifies its catalog card requirements in terms of elements to be printed and format (e.g., for laying up call numbers and subject headings). In use, the librarian calls up a catalog record by L.C. card number or by title, or by author-title. Modifications can be introduced into the copy of the record displayed on the terminal (though not into the data base itself). Once the record has been edited into an acceptable form, the librarian then issues a command that causes the edited record to be entered on the archival tape for subsequent storage, and of course, off-line production of cards for subsequent delivery to the library. Minimum time to deliver cards to a library is three days.

The estimated cost for operating the system through the year ending June 1972 was $729,333 of which some $315,000 came from the members themselves and the rest from state grants and other sources. The state grant has been reduced to one-half that figure for the current year and will be eliminated after the current fiscal year. Actual expenses for the fiscal year ending June 1972 were approximately $86,267 less than charges to the libraries and state grants. Thus the "cost" of the operation is $643,066. Cataloging production totaled approximately 500,000 titles creating 3.4 million cards.

Library N has no plans to produce an automated circulation system, though its output has been used as input to at least one automated circulation system. However, N is well along in the development of a compatible acquisitions system and a serials control system using the same data base that they anticipate will be operational in 1973. The incremental cost of the acquisition and serials system, if realized, would make the combined system very attractive economically.

SYSTEM OVERVIEW (CIRCULATION)

LIBRARY O

The Library O circulation system was installed in 1967 and is still operating in essentially the same form. It uses both book cards and borrower cards to input data through 3 Colorado Instrument terminals to a CDAK incremental tape recorder. The three terminals serve the three main sections of the library with a fourth available for backup. Processing is done on an IBM 360/67 operating as a 65 (batch mode). The programs are written in PL-1 and take approximately 125k core. Documentation is current and is in excellant shape. Access to circulation information is through printed lists: a long term list and a daily update. No on-line capability is provided.

The borrower file contains approximately 20,000 names, is stored on both disc and tape files in fixed and variable format with records of less than 120 characters. The item file typically runs approximately 18,000 items of fixed length records of 150 characters. Both files are all upper case. There is no automated cataloguing system so the files are not produced as a by product of other operations. Instead, files are created on an as needed basis and have been since the beginning of system operation.

Management information is unusally good - consisting of some six side inches of printout per year. Breakdowns are given by subject, publication date, type of borrower. In addition, machine analysis provides comparison with previous time periods for comparative purposes.

The automated system operates on all loans of more than three days. Shorter time periods are handled manually and manual procedures are available for system operation in the event of machine failure.

No current changes are planned in the system though it was indicated that were extra funds available, the first move would be to put the system on-line. Current system operating costs are approximately 52¢ per transaction.

SYSTEM OVERVIEW (CIRCULATION, ACQUISITION)

LIBRARY P

The Library P automated circulation system was installed in 1965 and is still operating essentially as originally designed. It operates on a Honeywell 200 and maes use of a PDP-11. It is basically a tape system rather than a disc system although there is a resident disc for the computer operating system. The system is not on-line. It operates instead with a daily printout of books in circulation.

Initial record conversion was done by converting all records of circulation together with all records for new acquisitions over a period of nine months prior to introduction of the system. All entries in several small branch libraries were also converted at this time. With this as a starting point, approximately 50% of the circulated books during the first full year of operation were found to be already in the data base; this figure increased to 75% during the second year and has gradually increased to a present figure of approximately 98%.

The original development cost was in the order of one man year. Programs were done in COBOL and are well documented. No unit operating costs were provided but Library P states that the system saved money almost from the beginning.

This circulation system provides an interesting example of one of the inherent difficulties in taking over an existing system: the system is very well tested after seven years of operation; it is, and has been from the beginning a substantial money saver. At the same time the system is an old one in a rapidly changing field and Library P expressed some surprise that anyone would be interested in acquiring it at this time; they, themselves, are in the process of designing a new system to be implemented on an IBM 370 over the next two years. Thus an existing, well-tested, and economic system which would seem to be an ideal candidate for use by other libraries is being replaced at the library where it was developed.

The evolution of the circulation system at Library P was a gradual one, in terms of the data base. Machine readable records were created from actual circulation information for a nine month period prior to introduction of the system. All new books were added during the same period (and since) and several smaller branch libraries were converted in toto at the beginning. With this as a starting point approximately 50% of the circulated books during the first full year of operation were found to be already in the data base; this figure increased to 75% during the second year and has gradually increased since that time to a present figure of approximately 98%.

The Library P acquisition system was put into operation in 1968 and remains in use, essentially unchanged, at this time though like the circulation system, plans are underway to replace it with a new system to be designed for the IBM model 370. In addition to most of the standard features one would expect in an acquisition system, the current system had, at one time, a capability for generating current accession lists. The use of these has been discontinued for lack of user interest and plans are now underway to produce a current awareness service applying user interest profiles based on title keywords and the LC subject classification.

The two systems are compatible and the acquisitions system generates input to the circulation system. Both operate on a complex of Honeywell 200's and PDP-11's mainly in tape (as opposed to disc) modes. The acquisitions systems uses Friden Flexowriters for input while the circulation makes use of 29 IBM 1030's for input of circulation information.

Future plans for Library P system are being worked out in conjunction with the other two university libraries in the area and are expected to be constructed as a set of modular packages that will handle (as a combined package) approximately 80% of the needs of each of the individual libraries. An additional set of special purpose packages will further allow the system to handle more specialized needs (approximately another 10% of the total system) and finally each of the three libraries will have to program the final ten percent of the system to meet their own needs.

SYSTEM OVERVIEW (CATALOGING)

LIBRARY Q

The Q library automation program (known as BALLOTS) is an integrated system that currently incorporates two of three main library functions; acquisitions and cataloging; circulation is to be accomodated in the future. The cataloging function is a direct by-product of the acquisitions function. The main data base is a recent MARC file (currently estimated to be between six and nine months of MARC) that is maintained on-line in an IBM 360/67 with access through programmable terminals and a PDP-11 acting as an interface computer.

Searching is done through SPIRES, a sophisticated information retrieval system initially constructed at Q for information retrieval of preprints associated with research activities at SLAC and subsequently extended to other applications.* The Q group now provides unique item retrieval even with relatively incomplete and/or noisy data. This capability appears to be more complete than any of the other search capabilities found in automated library systems.

The Q system is only going into production operation in the fall of 1972 and so no operating data is available. In its current implementation, the circulation systym will not be operative and the acquisitions system will not maintain a current activity file until the summer of 1973. The corresponding restriction on the cataloging system is that cataloging will only be possible through MARC records. Downstream planning includes addition of the capability to provide original cataloging through the system scheduled for late 1973. It is, however, possible to edit MARC records prior to production of images for printing of catalog cards. The catalog system produces catalog work slips, catalog card sets, spine labels and contains a unique search capability allowing unsuccessful searches to be automatically retried each week after new MARC data has been added to the files. This standing search feature discovers 50-70 titles per week.

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* This "usage" of SPIRES is through appropriate code embedded in BALLOTS code. In other words, BALLOTS is a completely self-sustaining, independent, and integrated system. It is not required to call upon external routines from SPIRES.

SYSTEM OVERVIEW (ACQUISITION)

LIBRARY R

The Library R system is a modest system in scope and in cost. It is implemented on a CDC 3300 under a special operating system prepared by the university computing staff to extend the machine's capabilities and reduce down time. (Down time is measured in hours per month, where it used to be measured in days per month.) Transferability of the system is thus limited to situations where CDC equipment is available and there is a willingness to replace the manufacturer supplied operating system. Programs are written in FORTRAN-IV and COMPASS (CDC's assembly language).

Although the computer center itself accepts long line linkages for other purposes, the present terminal hardware restricts the distance from the computing center to approximately 3,000 feet for terminals connected via coaxial cables (this limitation will soon be lifted). Experiments with other users have thus been limited to one situation where a small college was willing to perform the keying portion of its acquisitions on the R campus.

Economically, the system has been quite successful. Acquisitions personnel have been transferred to other duties, bookkeeping loads on the college bookkeeping operation have been reduced, lists of new books are more complete and are produced with less labor, and the system provides input to the cataloging operation which has resulted in some further saving there. The fund accounting system is sound and is now accepted by the state for legal accounting purposes. Good management information is provided on-line and regular reports may be produced at will by using standard stat packages available for other purposes in the university system.

The system has a nice "held" facility wherein it is possible to prepare entries, enter them in the system and hold until funds are available. This facility has been extremely valuable at the end of the fiscal year when extra funds are frequently made available with almost no notice. (In a recent year, the funds made available in the last 10 days of the fiscal year were sufficient to double the monography funds for the year.)

Personnel and computing costs are less than $2,000 per month and detailed breakdowns of computer costs allocations are available. The programming structure is modular using a concept called "FLAG WORD" wherein additional commands can be incorporated into the system at relatively little cost. Down stream improvements will include the addition of a claiming facility, the extention to eight more state schools, the extention to serial records and the creation of binding slips.

SYSTEM OVERVIEW (ACQUISITIONS & CATALOGING)

LIBRARY S

Library S provides a technical processing service for the libraries in the state (primarily the public libraries) that is in the process of being automated. The only automated function currently up and running is the book catalog production system originally developed at the Institute of Library Research (University of California, Berkeley) for production of the University of California Catalog Supplement. These programs have been revised and supplemented and fully documented and are currently in production use for several catalogs in the state.

In addition, the acquisitions and cataloging functions provided as part of the technical processing service are in the process of being automated. The acquisitions system is planned as a batch system to serve the present needs where the library using the service places its own orders on the bookseller. There is no accounting information provided and little in the way of management data.

The cataloging function will be a complete standard package with on-line capabilities but not connected to either acquisitions or circulation. It will, of course, be tied to the book production system. Early portions of these systems are expected to be up in mid-1973 with complete operation expected by mid-1974.

SYSTEM OVERVIEW (CATALOGING)

LIBRARY T

University T has been working in library automation for several years. Presently portions of a cataloging system are working in both on-line and batch modes. The software system is written in assembly language for a XDS Sigma 7 with 16 disk drives, 39 hard wired communication lines and several dial-up lines. The system processes all available bibliographic files such as L.C. Marc, BNB Marc, local Marc, and Canadian Marc into an internal file handling system. On-line indexes to the complete record files can be built according to a user specifications of search items. These indexes are usually specified as short form records to conserve on-line storage. The indexes point to complete records stored on the "Data files". These "Data files" are searched and records extracted by cycling through a sequence in which all disk packs are mounted and searched.

A catalog card printing system exists which provides a variety of optional formats of cards. It drives a Xerox X.G.P. (Xerox Graphic Printer) which xerographically prints cards in upper and lower case in two sizes. A general purpose formatting program is also available for working lists, book catalog formats and other printouts. This program is set up in each case to the user's specifications.

These on-line and batch seraching and printing capabilities have been offered since December 1971 to all libraries in T's area as "Marc Record Services". These services include (1) batch process searching of Marc files and storage of cataloging data for in-process cataloging. (2) Marc search and provision of lists of accessions. (3) Search and provision of MARC tapes of records. (4) Provision of "edit sheets" of catalog data for use in revision or adding local information. (5) On-line searching to files other than in-process files of L.C. card no, ISBN no., BNB no. This search determines existence of a record only and does not display any portion of the record.

An on-line MARC encoding system is operating using specially modified Teletype Model 37's with a full range of upper and lower case, accents and non-Roman characters. The symbol set used extends beyond the L.C. Marc set. The typist types a code string, supplied by a cataloger, which identifies the catalog elements contained in the record, and from that point the system prompts the encoding typist and automatically inserts in full form the specified tags. On-line editing is integral with the typing operation. The system works well and requires only a minimum of tagging by a cataloging editor. The typists successfully extract and type the proper text off of a card corresponding to the tags displayed by the prompting system. Close to 200,000 records have been processed through this system for retrospective records in the collection. Approximately 700,000 other records have been entered (and are kept updated) by a separate keypunch activity. These records are compatible with system MARC II and contain all MARC elements which can be obtained from a catalog card.

Future Plans

The system designers said that progress had been difficult in the past because of shortcomings in the suppliers time sharing software, but that a new monitor called UTS was being delivered which should solve their problem. Various CRT and printing terminals are being tried out on a test basis for eventual replacement or augmentation of the Teletype Model 37's.

The project is a large one having 13 programmers and an equivalent of over $30,000/month computer lease and maintenance. The staff places a value of nearly 3 million dollars on the retrospective encoded records. It is planned to exploit all of these resources by offering additional services to other libraries in the province, and some services are being offered already.

The future plans include redesigning the MARC file and index processors. These are relatively old programs with a lot of generality built in as add-ons. In addition, we were told that the master file protection and index generation processes are inefficient. This is expected to be only a 6-12 man--mo. activity as component routines exist. Other future plans are to link with more outside users to expand the use of the system so that its development costs are spread over a larger user base. In this expansion program, circulation control capabilities will be developed.

SYSTEM OVERVIEW (CATALOGING)

LIBRARY U

Background

The current effort at U had its origin in the work of a Columbia University doctoral candidate who measured the rate of deterioration on catalog cards in large research libraries. At U approximately 20% of its then 9,000,000 cards showed substantial deterioration in 1967.

This student's work led to the Henderson-Rosenthel report since published by the MIT Press. The basic recommendations of this report were:

a. Cut-off the catalog of the research library. After cut-off restore the deteriorated cards and reproduce the entire catalog by some form of photography.

b. Attempt to automate from the cut-off point forward. Originally the plan was to have a card catalog with book supplements or vice versa. But as early as 1969 it was decided not to produce cards.

Design Philosophy

The Henderson-Rosenthal report established as a fundamental principle that no future automated system should "water down" existing manual methods of bibliographical control. It also enunciated a fundamental design philosophy which became the corner stone of the existing system: a single machine readable authority file which includes subjects, series, and names, and against which every new record would be checked before entering the system. With the development of MARC two related design concepts were added: the use of the MARC record structure and adoption of Library of Congress cataloging.

Thus the design philosophy comprises four elements:

a. an authority file system
b. a book catalog without catalog cards
c. MARC records
d. LC cataloging

Description of Services

Library U is really two libraries in one: a research library and a public library with 86 branches. Consequently, it was necessary to develop two rather different data bases: one for the research library with its essentially one copy per title collection policy and its continuously growing collection; and a second data base for the branches with their multiple copies per title and relatively quick, 5 to 7 years, turnover of book stock. Thus, while one set of authority files serves both systems, two separate data files are maintained.

From these data files two book catalogs are produced on a schedule of "continuous re-accumulation." This means that the alphabet for each system has been divided into 12 proportional pieces. In any given month 1/2 of the alphabet is re-accumulated and the other letters are compiled in a supplement, that is, all records for new books in a particular cycle are either in the re-accumulation or in the supplement. So each month a new partial cumulation and a new supplement are produced for the branches and a separate such set for the Research Library. These catalogs are produced by means of Videocomp. The system creates a tape to drive the Videocomp and this tape is then used to generate masters which a printer uses to produce catalogs. At this time the cost of production is about $100,000 per year for the branches and $90,000 for the Research Library. About 200 copies are produced for the Research Library of which twenty are sold. The Branch Libraries will have 550 to 600 copies of their own catalog.

Each catalog represents only those records incorporated into the system since February 1972. (see questionnaire) As the system expands the catalog will increase in size and so will the cost of production. The systems' staff believe the cost will remain in bounds over the next ten years although he foresees an increase in cost proportional to the increase in the size of the data file; and by the end of the ten years the system should be "re-done anyhow." It will be a good experiment to watch for this reason alone.

The Branch catalog is quite similar to the Research Library's. The primary visible difference is in classification since the Research Library uses a kind of bench mark or accession shelf mark system which is uniquely its own. Another difference is in holdings statements. While the internal machine record can and does contain all holdings it was judged too expensive to print all holdings for all branches. Only those of the principal branches are printed but the catalog records the holdings of the reserve collections in each borough so almost all titles are covered and the needs of interbranch loans are met. Access to the complete holdings file will shortly be established by means of a new Union Catalog section which will utilize IBM 2740's to interrogate the data base on-line when the Union Catalog section is itself queried by telephone.

The book catalogs are the principal products of the system but certain other products are essential to its operation. A series of processing information lists are produced which are vital to either library's acquisitions activity. Since there is no card catalog, as such, acquisitions would be impossibly duplicative and expensive without these lists which permit bibliographers and searchers to determine whether an item is an order.

A somewhat less vital but extremely important set of products is the cataloging work sheet which reports the results of authority comparisons to catalogers and permits necessary adaptations although these are held to a bare minimum.

Thirdly, two shelf list cards are produced with each book. These are sent to the branches and can be used as the branch librarians "see fit."

Computer System Growth Potential

The system was designed for a 360/40 DOS with 256K bytes. It is now run on a 370/145 but could still be run on a 360/40. The largest program, the authority system, requires 160K of core. The immediate projected modifications are conversion to OS in order to obtain software support for variable length disc records. Secondly, the staff expressed a desire to use VSAM, "if it works" instead of index sequential.

Can the system be expanded? Yes, it can. How much it is difficult to say. One indication is that of the system's $360,000.00 per annum computer bill, $200,000.00 is paid for by renting to private industry.

Conclusion

The system appears to me to be remarkably successful. I am most impressed by its authority sub-system which not only makes a substantial saving in cataloger time but also insures a remarkable consistency in the catalog, together with a flexibility to meet sweeping changes. (Contrast this rigid control with the flaccidity of the OCLC system.) A possible weakness in application, although not in the system's intrinsic design is a marked tendency to eliminate *see also* references.

A second main feature of the system is the transition to a book catalog with its virtual elimination of catalog cards, certainly a consummation devoutly to be wished. The initial production seems to be cost beneficial but will it continue to be so as the data base expands? Nevertheless, the individual record is thoroughly complete in contrast, for example, to the abbreviated record which some mechanized systems produce, and the processing information lists and shelf list cards, together with the Union Catalog Section with its capability to directly interrogate the computer holdings may have eliminated the need for the card catalog. I certainly hope this is true but I believe the system as described is still untested and circumstances as well as user response may force some modifications. For example, the larger branches may need separate catalogs rather than one massive one, special control listings may be required for processing books.

SYSTEM OVERVIEW (CIRCULATION)

LIBRARY V

Library V has a circulation system which uses a System 7 mini computer as a stand alone circulation data collection and transaction display terminal. Twice a day it communicates with a 370-165 university computer which on a daily batch basis produces a disk transaction file for the System 7 which allows it to operate stand alone for the next day. In addition, the daily batch process produces circulation lists and other products such as 15 varieties of notices, daily statistics, and message listings of various sorts. The batch system also has some management data reporting capability available on an on-demand basis.

The system has a capacity for 16 collection terminals in its present configuration, and has keyboard entry for borrower I.D. and transaction numbers, etc. The terminal has a display panel which prompts its operator through the transaction operation so that little training is necessary.

There are 24 distinct types of transactions available which can be programmed to suit any particular use. The stand alone System 7 file does not contain all books on loan, only records affecting a loan transaction: i.e., reserve, bad borrower, etc., and the transactions for the day. This of course precludes any on-line or remote author, title, call no. search of either the books on loan or the entire list. Books on loan are searched from daily printout lists.

SYSTEM OVERVIEW (ACQUISITIONS & CIRCULATION)

LIBRARY W

The Library W automated system is the one originally created at Florida Atlantic University in 1967 and transferred to Library W in 1971. Programs were originally written in COBOL for the IBM 360 (Disc Operating System) and were converted to the Honeywell 200 at Library W with apparently little difficulty. As one of the early, well-publisized systems, a number of requests have been, and are still being received for information about the system. According to the latest Annual Report of the librarian, the system is being tested at the University of Wisconsin at Milwaukee, and Sacramento State College (now California State University, Sacramento), for potential application at those schools.

Both the acquisition and circulation systems were developed as card input systems so that the 80-character record is fundamental to the general plan of approach. Introduction of the system at Library W resulted in a substantial transfer of personnel from technical processing to public services (9.72 F.T.E. during 1971/2 and 13.2 F.T.E. during the two year period). Costs on a per volume circulated basis for 1971/2 were $3.79 as opposed to $4.03 for 1969/70 for all of technical processing. There was also a substantial reduction of backlog in the technical processing operation.

As money becomes available it is expected that a mini-computer will be obtained and tied to the main frame by telephone lines to provide on-line exception reporting for the circulation system.

SYSTEM OVERVIEW (CATALOGING)

LIBRARY X

The MARC-O/SLICE system operating at Library X is a MARC based system operating in batch mode on a 370/155 situated at the State Highway Department. The objective of the system is to provide a library processing service based on MARC records only. (No original cataloging is permitted in the system.)

The services provided include sets of catalog cards (in varying formats), catalog copy, holdings of MARC record monographs (for up to 20 libraries in the system), and an SDI system to enhance access to the MARC data base. Machine access is provided by way of LC number only. CIP records are not introduced into the system although they are used in connection with the SDI service. Management information statistics are limited to keeping a record of match-no-match data.

The main system is programmed in basic assembly language and the SDI system is done in COBOL. Disc storage capacity is eight 3330 disc packs of which two are currently used to hold the present MARC file.

Users find the system to be quite economic and useful in obtaining access to the MARC data base. Some users apparently are primarily interested in getting cataloging copy for records not yet distributed by the LC proof slip service. The service will also supply magneform catalog copy.

SYSTEM OVERVIEW (CATALOGING & ACQUISITIONS)

LIBRARY Y

Library Y planned a detailed comprehensive system covering acquisitions, cataloging, and circulation. Acquisitions and cataloging have been implemented and in use since October of 1969 - including a book catalog production system. Circulation has been programmed and checked out but not implemented due to failure of Singer-Friden to produce the required transactors.

Acquisitions and cataloging both operate in batch mode on the County computer system which uses an RCA Spectra 70/45. The county is presently studying its own needs and will replace the existing system some time in the next two to three years. Production turn-around time has also led to difficulties in the eventual imple mentation of the circulation system so that current thinking at the library has turned towards introduction of a mini-computer sometime in the next six months to reduce data input costs (which presently require cycling 7 tapes through the main computer to obtain any editing).

The current system is modular in nature, provides nice feedback loops, particularly in the acquisitions cycle, and handles a wide variety of acquisitions control problems. The cataloging system originally made use of MARC tapes (and still has that capability) but such use has been discontinued because it was found that for their applications the unit cost of using

MARC records was significantly greater than the unit cost of direct keying. Detail cost figures on both development and operating costs are available.

After three years of experience with the system, the main difficulty noted is that the system requirements on library personnel have led to some difficulty. Future implementation will be planned to reduce the degree of difficulty primarily by simplifying input to system and extending in-house training courses.

SYSTEM OVERVIEW (CATALOGING)

LIBRARY Z

The general impression of the Library Z computerization project, in comparison with others, is that it is one of greater sophistication, less parochialism, and far less adventurousness. The project's leader is very eager to go on from cataloging into acquisitions, serials, and circulation; but the prospect seems strong that the library will want to be a member of a regional system analogous to OCLC, and thus it can be said in briefest summary that the library would scarcely recommend its own product for application in California.

Despite a smooth-running operation that must be commended, it seems a pity that in six years an institution as large and (one would imagine) well-funded as Library Z has not gone beyond cataloging in its computerization efforts. The quantity of materials handled in the system is, however, considerable and expansible at need. Here too, there are any number of functions (shown in the questionnaire as "could"s) that are not in operation because not felt to be needed at present.

Detailed comments on a few questionnaire items: (p.3) Interesting possibility of moving main body of card right or down to clear any unusually long call number or heading. (p.7-9) Retrieval seems entirely outside the system's possibility: note the extremely small number of access points, and the whole concentration of access of absolutely unique items of information rather than of classes (or intersecting logical-operation subclasses) of items. (p.12) Lack of management information planning (not even "could" here) is based on the supposition that no one would analyze such output. (p.16) Baud rate is what is used, but the hardware is capable of 2400.

Even with their intention to go to an OCLC-type regionalism, the Library Z people are remarkably sanguine about the cash value of their accomplishments to date. In view of their light holding in monographs relative to serials, though, such a conclusion seems premature till serials are under computer control.

SYSTEM OVERVIEW (CIRCULATION)

LIBRARY AA

The Library AA system was begun eight years ago by personnel who preceded the present systems librarian at the university. In the initial phase of development, many difficulties were encountered because of poor system design and by reason of the changing procedures in the University computer center. When the present systems librarian arrived, he found it necessary to restructure many of the system components and to adapt the system to the IBM 360 computer.

The main design objectives of the system, which have been stated elsewhere, are:

1. Eliminate borrower participation in the check-out process.
2. Speed and simplify circulation procedures.
3. Eliminate manual file maintenance
4. Permit identification of the status of any book within the system
5. Provide accurate and up-to-date statistics concerning the use of library materials, including the number of times a book is used
6. Provide guidance from the system in case of human error while conducting a transaction
7. Reduce clerical operations

The services provided by the system include primarily the maintenance of the circulation file on discs in the computing center. The file is accessible on a shared-time basis during all the hours when the University Library is open. Batch processing of statistical data on overdue notices takes place at night. The system also offers on-line recall of data not only from the basic circulation file but also from the university man file, a feature which allows the successive discovery of previous borrowers, the identifications of addresses and telephone numbers, and other data which may be necessary to trace the location of a book during the working day.

Statistics provided by the system go far beyond a daily circulation record. The circulation history of any book in the collection can be assembled by special subroutine, a feature which is useful when a book has been mutilated. The incidence of collection use can be compiled for subject fields (and these can be defined in broad or narrow terms) and the growth of collection use in those subject fields can be monitored. For example, the past academic year showed an unusual increase of circulation in the fields of Law and Social Sciences, a clear indication that acquisition policy in these fields should be reviewed. In addition to this review of collection use, field by field, total assessment of collection use can be made; for example, during the last academic year, 11.6% of the collection was borrowed.

Statistics concerning borrowers are also easily available through the system. The borrowing history of an individual student can be made available to his guidance officer for use with his grade averages (there is some anxiety here about the problem of invasion of privacy). It is also possible to collect statistical measures of library use by student class. Recent examples of this measure show that freshman and sophomores are becoming heavier users of the Library, and this probably reflects changes in teaching techniques.

It should be noted that the circulation system in the Library relys heavily on an interface with the University's machine-based personnel file. Essentially, the circulation system is a converted shelf list to which flags can be added to assemble material concerning the borrower from the existing personnel files. In a sense, then, the system depends for its success on the continuation of these machine-based personnel records.

Two other characteristics of the system should be noted. First, the total bibliographical file is small (250,000 records with a growth capacity to 300,000). In addition, the size of the record for each item in the file has been kept small. Second, the borrower file is larger than would be expected in many institutions of similar size, since it attempts to handle input from night school students and library use by the surrounding civil community.

APPENDIX B

Names and Addresses of Library Staffs Interviewed

Code	Organization	Responsible Person
A	Syracuse University Syracuse New York 13210	Mr. Warren Boes, Director Theresa Strozik, Asst. Dir., Automation
B	Columbia University 535 W. 114 Street New York, NY 10025	Mr. Warren Haas, Librarian Mr. Erle Kemp, Head, Tech. Proc. Mrs. Heike Kordish
C	University of Pittsburgh Pittsburgh Pennsylvania 15213	Mr. John Slater
D	University of Massachusetts Amherst Massachusetts 01002	Mr. Richard Talbot, Act. Dir.
F	Yale University New Haven Connecticut 06510	Mr. Dave Weisbrod
G	Cleveland Public Library 325 Superior Avenue Cleveland, Ohio 44114	Mr. Walter Curley, Librarian
H	ANALYTS Lower Concourse Roosevelt Field, Garden City New York, NY 11530	Mr. Joseph Eisner, Director
I	Rutgers University New Brunswick New Jersey 08901	Mr. Donald Luck, Head, Tech. Proc. Mrs. V. Whitney, Librarian
J	Northwestern University Evanston Illinois 60201	Ms. Velma Veneziano Mr. McCowan, Librarian
K	Nassau County Library System Roosevelt Field Lower Concourse, Garden City New York, NY 11530	Mr. Dick Pfefferle
L	Western Kentucky University Bowling Green Kentucky 42101	Ms. Patricia W. Custead
M	Ohio State University 1858 Neil Avenue Columbus, Ohio 43210	Mr. Hugh Atkinson
N	Ohio College Library Center 1550 W. Henderson Rd. Columbus, Ohio 43220	Mr. Frederick G. Kilgour, Director

Code	Organization	Responsible Person
O	Washington State University Pullman Washington 99163	Ms. Joselyn Druschel
P	University of British Columbia Vancouver 8, B.C., Canada	Mr. B. Stuart Stubbs, Librarian
Q	Stanford University Stanford California 94305	Mr. Allen Veaner
R	Oregon State University Corvalts Oregon 97331	Mr. Larry Auld
S	California State Library P.O. Box 2037 Sacramento, Calif. 95801	Mr. Gerry Newton
T	University of Toronto Library Office Kings College Circle Toronto, Canada	Dr. Robert H. Blackburn
U	New York Public Library 20 West 53rd Street New York, NY 10019	Mr. James A. Rizzolo
V	University of Pennsylvania 3420 Walnut Street Philadelphia, PA 19104	Mr. Bob Kerney
W	Arizona State University Tempe Arizona 85281	Dr. H. Wm. Axford, Librarian
X	Oklahoma Dept. of Libraries 109 State Capital Oklahoma City, OK 73105	Mr. Robert L. Clark, Librarian
Y	Orange County Public Library 431 South Manchester Orange, CA 92668	Mr. H. Wm. Kirkwood, Director
Z	Georgia Ins. of Technology Atlanta Georgia	Mr. John Kennedy
AA	Eastern Illinois University Charleston Illinois 61920	Dr. Joseph B. Szerenyi, Librarian

APPENDIX C

Sample Questionnaires

ACQUISITION SYSTEM

A. GENERAL CHARACTERISTICS

1. Types and quantities of materials processed.

Type of Material		No. Processed Per Yr.*		
		Automated System	Manual System	Total
a. Monographs.	(titles)			
	(vols.)			
b. Microforms.	(titles)			
	(vols.)			
c. Films.	(titles)			
	(vols.)			
d. Filmstrips.	(titles)			
	(vols.)			
e. Records.	(titles)			
	(vols.)			
f. Tapes.	(titles)			
	(vols.)			
g. Maps.	(titles)			
	(vols.)			
h. Manuscripts.	(titles)			
	(vols.)			
i. Subscriptions, new	(titles)			
j. Subscriptions, renewal	(titles)			
k. Standing orders, approvals and continuations.	(titles)			
	(vols.			

*If information on no. of records processed per year is not available, just check each category on a yes-no basis.

Type of Material (con't)		No. Processed Per Yr.* Automated System	Manual System	Total
l. Orders for branches or departments.	(titles)	________	________	________
	(vols.)	________	________	________
m. Gifts and exchanges	(titles)	________	________	________
	(vols.)	________	________	________
n. Supplies & equipment	(titles)	________	________	________
	(vols.)	________	________	________
o. Added copies and volumes.	(titles)	________	________	________
	(vols.)	________	________	________
p. Other (specify).		________	________	________

*If information on no. of records processed per year is not available, just check each category on a yes-no basis.

2. What are the resons for excluding the categories that are excluded?

____

____

____

____

____

____

3. Are the manual and automated systems integrated? Yes______ No______

(All of the following questions refer to the automated system only.

4. What is the maximum number of titles that can be processed by the existing system? ________

5. When is the machine record created?

a. When request is received. ________

b. After decision to buy. ________

c. Other (specify).________________________________

6. If the system includes requested and/or desired items as well as items ordered, what categories does it include?

   a. Faculty generated requests. ____________

   b. Faculty generated requests delayed until money is available. ____________

   c. Library (e.g., Acquisition/Selections Dept.) initiated requests. ____________

   d. Want list (desiderata items). ____________

7. Does the system provide for:

   a. Control over items in process as well as items ordered? ____________

   b. Claim periods of different duration (e.g., foreign or domestic source?) ____________

   c. Automatic conversion of foreign currency? ____________

      (1) If yes, how up-to-date are the conversion factors? ________________________

      (2) If yes, what conversion factors are used (e.g., London or Federal Reserve)?

      ____

   d. Partial shipments? ____________

   e. Automatic cancellation after specified time period? ____________

   f. Reissue to a different vendor (when first vendor cannot supply item) without retyping the order? ____________

   g. Delayed items (e.g., In-press items) with automatic claiming after specified period? ____________

   h. Deposit accounts? ____________

      (1) If yes, are there any checks for duplicate billing? ____________

i. Items that must be paid in advance? ______

j. Fund reporting? ______

k. Maintaining totals for postage and miscellaneous charges? ______

l. Automatic checking (searching) for duplicate orders? ______

m. Changing budget information (e.g., fund allotments) during the year? ______

n. Bringing forward previous year's balances? ______

o. Bringing forward previous year's encumbrances? ______

p. Elimination of duplication between monographs and standing orders? ______

q. Updating the vendor file (e.g., purging little used vendors)? ______

r. Special processing for particular vendors? ______

s. Automatic assignment of fund based on subject category? ______

8. Does the system generate bibliographic input for an automated catalog system? ______

9. Does the system generate bibliographic input for an automated circulation system? ______

10. Does the system receive input from sources?

a. MARC tapes. ______

b. Vendor tapes. ______

c. Library's bibliographic store (machine readable catalog). ______

d. Other (specify). ______

______

11. Do you keep a "history" file of orders received and processed? ______

a. If machine readable, what is the storage medium? ______

b. If a printed list is kept, how is it arranged? __________

c. If a printed list is kept, are there indexes to it? __________

B. DATA BASE

1. On-order (in process) file.

   a. No. of records. __________

   b. No. of types of orders. __________

   c. Maximum no. of characters per record. __________

   d. No. of data elements (approximate). __________

   e. Is file on-line? __________

   f. Format.

      (1) Fixed. __________

      (2) Variable. __________

      (3) Fixed and variable. __________

   g. Storage medium:

      disc__________ magnetic tape__________

      other (specify)________________________

   h. Does character set include:

      (1) Upper and lower case? __________

      (2) MARC II specials and diacritics? __________

   i. Does your input system include validation routines? __________

   j. In correcting records, how much data has to be rekeyed?

      (1) The entire record. __________

      (2) The entire field. __________

      (3) The entire subfield. __________

2. Vendor file.

   a. No. of records. ______

   b. No. of types of vendors. ______

   c. Maximum no. of characters per record. ______

   d. No. of data elements (approximate) ______

   e. Is file on-line? ______

   f. Format.

      (1) Fixed. ______

      (2) Variable. ______

      (3) Fixed and variable. ______

   g. Storage medium:

      Disc______ Magnetic tape______

      Other (specify)______

   h. Does character set include:

      (1) Upper and lower case? ______

      (2) MARC II specials and diacritics? ______

   i. Does your input system include validation routines? ______

   j. In correcting records, how much data has to be rekeyed?

      (1) The entire record. ______

      (2) The entire field. ______

      (3) The entire subfield. ______

3. Fund file.

   a. No. of records. ______

   b. No. of levels of fund identification (Levels refers to hierarchical levels. If Fund #7 is Science and Technology and 7a is Chemistry, there are 2 levels of funds). ______

c. No. of funds. ________

d. Maximum no. of characters per record? ________

e. No. of data elements (approximate). ________

f. Is file on-line? ________

g. Storage medium:

Disc__________ Magnetic tape__________

Other (specify)__________________________

h. Does the character set include:

(1) Upper and lower case? ________

(2) MARC II specials and diacritics? ________

i. Does your input system include validation routines? ________

j. In correcting records, how much data has to be rekeyed?

(1) The entire record. ________

(2) The entire field. ________

(3) The entire subfield. ________

C. PRODUCTS AND SERVICES.

	On-line	Batch
1. Searching/selecting records from the file.		
a. Hours/day (On-line) or Frequency (batch)	______	________
b. Access points	______	________
(1) Order no.	______	________
(2) L.C. card no.	______	________
(3) ISBN no.	______	________
(4) Main entry.	______	________
(5) Title.	______	________

(6) Publisher. _______ __________

(7) Place published. _______ __________

(8) Vendor. _______ __________

(9) Fund. _______ __________

(10) Series title. _______ __________

(11) Date ordered. _______ __________

(12) Other (specify). ____________________________________

c. If your system uses a search code, describe it.

____

____

____

d. Record displayed (on-line system) or printed (batch system) for verification.

Explanation of terms and recording instructions.

(1) First Level Response Data: Data displayed or printed after the first search. For example, if 30 records match the search key or element, what bibliographic elements from these 30 records are displayed or printed at that time?

(2) Second Level Response Data: Data displayed or printed when additional data is requested for particular records or groups of records. For example, requesting to see, in full(er) form, data for records #2, #15, and #26 after scanning abbreviated forms of 30 records.

(3) If the complete data element is not displayed or printed, record the number of characters of it that are displayed or printed rather than a check mark in the appropriate column.

(4) If the full(er) form of the record is displayed or printed as First Level Response Data when there is only one match on the first search, do not record this case as First Level Response

Data. Note this case on the lines below and record the more general case, i.e., more than one response on first search, in the First Level Response column.

Full data is displayed when only one match.
Yes _____
No _____

	First Level Response Data		Second Level Response Data	
	On-line	Batch	On-line	Batch
LC card no.				
ISBN no.				
Local accession no.				
Main entry.				
Title.				
Added entries.				
Subject entries.				
Publisher.				
Place published.				
Call no.				
Other (specify)				

(5) Are tags displayed as well as data fields?
Yes _____
No _____

2. Printed products.

a. Notification to requestor that item is ordered __________

b. Notification to requestor that item is available. __________

c. Typed (printed) order. __________

d. Outstanding order in-process lists (or indexes to a list) by:

(1) Order no.______________If yes, how often? __________

(2) Author __________ If yes, how often? ______

(3) Title __________ If yes, how often? ______

(4) Department __________ If yes, how often? ______

(5) Vendor __________ If yes, how often? ______

(6) Fund __________ If yes, how often? ______

(7) Call no. __________ If yes, how often? ______

(8) Series title. __________ If yes, how often? ______

(9) Date ordered. __________ If yes, how often? ______

(10) Other (specify). ______________________________

____

e. Accession lists. ______

f. Invoice voucher. ______

g. Checks. ______

h. Lists of delinquent orders (for human review). ______

i. Claim notices. ______

(1) If yes, are the claim notices:

(a) Sent directly to the publisher? ______

(b) Reviewed by staff before being sent to publisher? ______

j. Cancellation lists. ______

k. Want lists. ______

l. Lists of vendors. ______

D. MANAGEMENT INFORMATION

1. Does your system generate statistical and/or management data? ______

a. No. of titles/vols. ordered. (titles) ______
(vols.) ______

If yes, how often? ______

b. No. of titles/vols. ordered by type of material (e.g., books, journals) (titles) ____________
(vols.) ____________

(1) If yes, how many types? ____________

(2) If yes, how often? ____________

c. No. of titles/vols. ordered by fund. (titles) ____________
(vols.) ____________

(1) If yes, how many funds? ____________

(2) If yes, how often? ____________

d. No. of titles/vols. ordered by fund subdivided by subject category. (titles) ____________
(vols.) ____________

(1) If yes, how many subject categories? ____________

(2) If yes, how often? ____________

e. No. of titles/vols. ordered by language (titles) ____________
(vols.) ____________

(1) If yes, how often? ____________

f. No. of titles/vols. ordered by subject category? (titles) ____________
(vols.) ____________

(1) If yes, how many classes? ____________

(2) If yes, how often? ____________

g. No. of titles/vols. ordered by country of origin? (titles) ____________
(vols.) ____________

(1) If yes, how often? ____________

h. No. of orders for duplicates? (titles) ____________
(vols.) ____________

(1) If yes, how often? ____________

i. Expenditures by type of material (titles) ________
(vols.) ________

(1) If yes, how often? ________

j. Expenditures by fund. (titles) ________
(vols.) ________

(1) If yes, how often? ________

k. Expenditures by fund, subdivided by subject category. (titles) ________
(vols.) ________

(1) If yes, how often? ________

l. Expenditures by language. (titles) ________
(vols.) ________

(1) If yes, how often? ________

m. Expenditures by subject category. (titles) ________
(vols.) ________

n. Expenditures by country of origin. (titles) ________
(vols.) ________

(1) If yes, how often? ________

o. Performance date on vendors.

(1) Time elapsed between date ordered and date received for foreign & domestic orders. ________

(2) Claim response. ________

(3) No. of cancellations compared to no. of vols. ordered. ________

(4) Discounts received versus discounts offered. ________

p. Performance data on ordering operation (e.g., time elapsed between date requested and date ordered or rejected, etc.).

q. Fund reports:

(1) How often______________________________

(2) Do they indicate:

(a) Total allocation __________

(b) Amount encumbered __________

(c) Amount encumbered for items received but invoices not received __________

(d) Amount liquidated to date __________

(e) Balance __________

2. Does the system generate statistics correlating any or all of the categories mentioned above (e.g., expenditures for journals [type of material category] in French [language category]).

3. Is there any computer analysis or interpretation of statistical data (e.g., comparisons with norms or previous performance)? __________

a. If yes, describe.______________________________

____

____

4. Do your programs generate costs for producing products and services? __________

5. Do these costs include overhead (e.g., program and data base maintenance, supervision, facilities). __________

E. SOFTWARE

1. What language(s) are the programs in? ________

2. Are literals and constants loaded from tables? ________

3. How complete is the documentation? ________

   a. User instructions. ________

   b. Machine operator instructions. ________

   c. General system description. ________

   d. Program flow charts. ________

   e. Commented program listings. ________

4. How long has the system been in operation? ________

5. What percentage of the programs in the system have been in production more than 6 months? ________

6. How up-to-date is the documentation?________________

   ____

7. Who should be contacted about acquiring your system?

   ____

   ____

8. If a transfer of your system were appropriate what thoughts do you have on a practical transfer procedure?

   ____

   ____

   ____

   ____

   ____

   ____

F. HARDWARE

1. Where is the hardware?
   - a. Library. ____
   - b. Institution's computer center. ____
   - c. Service bureau. ____
   - d. Other (specify). ____

2. Name(s) and quantity of processors. ____

3. Minimum core required to run the system. ____

4. Name(s) and quantity of display terminals. ____

5. Name(s) and quantity of line printers. ____

6. Name(s) and quantity of card readers. ____

7. Name(s) and quantity of card punches. ____

8. Name(s) and quantity of magnetic tape drives. ____

9. Name(s) and quantity of disc drives. ____

10. Number of disc packs. ____

11. Type of communication lines used.
    - a. Normal telephone lines. (If used. record the baud rate instead of a yes-no check mark) ____

b. TWX. ________

c. Conditioned telephone lines. (If used, record the baud rate.) ________

d. Hard wire communications lines. ________

e. Other (specify). ________________________

____

12. What special communication equipment is used? ________

____

____

13. Are there any special features (e.g., special character set, special editing features, programmability) on your terminals? ________________________

____

____

14. Name and quantity of input devices for order records creation. ________________________

____

15. Name and quantity of devices for recording changes in status (e.g., book received, invoices received, cataloged, etc.) ________________________

____

16. Name(s) and quantity of other hardware in the system.

____

____

____

17. If the same hardware is used for more than one of the functions noted above (e.g., display terminals are used to record changes in status), explain.

____

____

G. PERSONNEL CHARACTERISTICS

1. Types and number of personnel required to run the system.

Types	No.
a. Systems analysts.	________
b. Programmers.	________
c. Library data processing coordinators. (Librarians with data processing training and/or experience.)	________
d. Professional librarians.	________
e. Subprofessionals.	________
f. Clerk-typists.	________

2. Are there any special training programs or packages available (e.g., manuals, programmed instructions, workshops, etc.)?________________________________

____

____

____

H. OPERATING COSTS

1. What is the cost of the system for:
   - a. Hardware? ________
     - (1) CPU costs/mo. ________
     - (2) Input-output costs/mo. ________
   - b. Personnel? ________
   - c. Materials (forms, etc.)? ________
2. Is the hardware dedicated to the library? ________
   - a. If not, what percentage is used by others? ________
3. What were the data conversion costs? ________
   - a. How many titles were converted? ________

4. What are the present input encoding costs? ________

5. What were the start-up programming and system design costs? ________

6. What unit operating costs do you have available? ________

____

7. Do you agree with any of these statements?

Automated systems will provide services at lower costs:

__________ in the near future.
__________ eventually.

Automated systems will provide better services:

__________ at lower costs.

    __________ in the near future.
    __________ eventually.

__________ at the same costs.

    __________ in the near future.
    __________ eventually.

__________ at higher costs.

    __________ in the near future.
    __________ eventually.

I. FUTURE PLANS

1. Are you presently planning any major changes in your system?

____

____

____

____

2. If money were available, what changes do you think you would make in your system?

____

____

____

CATALOGING SYSTEM

A. GENERAL CHARACTERISTICS

1. Types and quantities of materials processed.

Type of Material		No. Processed Per Yr.*		
		Automated System	Manual System	Total
a. Monographs.	(titles)	______	______	______
	(vols.)	______	______	______
b. Serials.	(titles)	______	______	______
	(vols.)	______	______	______
c. Microforms.	(titles)	______	______	______
	(vols.)	______	______	______
d. Films.	(titles)	______	______	______
	(vols.)	______	______	______
e. Filmstrips.	(titles)	______	______	______
	(vols.)	______	______	______
f. Records.	(titles)	______	______	______
	(vols.)	______	______	______
g. Tapes.	(titles)	______	______	______
	(vols.)	______	______	______
h. Maps.	(titles)	______	______	______
	(vols.)	______	______	______
i. Government documents.	(titles)	______	______	______
	(vols.)	______	______	______
j. Manuscripts.	(titles)	______	______	______
	(vols.)	______	______	______
k. Added copies.	(titles)	______	______	______
	(vols.)	______	______	______
l. Added volumes.	(titles)	______	______	______
	(vols.)	______	______	______

* If information on no. of records processed per year is not available, just check each category on a yes-no basis.

Type of Material (con't)		No. Processed Per Yr.*		
		Automated System	Manual System	Total
m. Cataloging with MARC records.	(titles)			
	(vols.)			
n. Cataloging with LC hard copy.	(titles)			
	(vols.)			
o. Original cataloging.	(titles)			
	(vols.)			
p. Cataloging of foreign language material.	(titles)			
	(vols.)			
q. Reclassification.	(titles)			
	(vols.)			
r. Retrospective conversion to machine readable form.	(titles)			
	(vols.)			
s. Cataloging for branches or departments.	(titles)			
	(vols.)			
t. Other (specify).				

* If information on no. of records processed per year is not available, just check each category on a yes-no basis.

2. What are the reasons for excluding the categories that are excluded?

3. Are the manual and automated system integrated? Yes ________
No ________

(All of the following questions refer to the automated system only.)

4. What are the maximum number of titles that can be processed with the existing system? ________

5. Does the system provide for variations in catalog card format?

   a. Formatting of LC call numbers on cards and spine labels. ________

   b. Determination of an oversize book for automatic generation of an oversize symbol (from a MARC record). ________

   c. Printing copy and volume numbers on spine labels. ________

   d. Printing of branch symbols on spine labels and cards. ________

   e. Printing tracings on any or all of the cards ________

   f. Printing contents and general notes on any or all cards. ________

   g. Positioning subject headings on the cards. ________

   h. Positioning headings at the top of the cards. ________

   i. Capitalization of headings at the top of the cards. ________

   j. Other (specify).____

   ____

   ____

5. Does the system have authority file information in machine readable form?

   a. Author. ________

   b. Subject. ________

   c. Series. ________

   d. Title (Conventional) ________

6. Does it use the authority files to generate:
    - a. Cross reference cards for the card catalog?
    - b. Cross reference entries for book catalogs?

7. Does the system retain and update holdings information?
    - a. If yes, can it accommodate more than one call no. (class no./book no.) for the same title?

8. If added copies and added volumes are processed, does the system generate new updated products (e.g., shelf list cards) or are the older products updated manually?

9. Does the cataloging system receive input from an automated acquisition system?

10. Does the cataloging system generate input for an automated circulation system?

11. Does the cataloging system generate input for an automated acquisition system (e.g., when ordering an added copy of an item that is in the machine readable catalog, using the bibliographic information in the file rather than rekeying it)?

B. DATA BASE

1. No. of records.

2. No. of types of item identified.

3. Maximum no. of characters per record.

4. No. of data elements (approximate).

5. Is file on-line?

6. Format:
    - a. Fixed?
    - b. Variable?
    - c. Fixed & Variable?

7. Storage medium:

   a. Disc__________ Magnetic tape__________

   b. Other (specify).____

   ____

8. Does character set include:

   a. Upper and lower case? __________

   b. MARC II specials and diacritics? __________

9. Source

   a. MARC tapes. __________

   b. Local acquisition system. __________

   c. Local input for cataloging system. __________

   d. Other (specify).____

   ____

10. If the MARC tapes are a source of your data base:

    a. Does your system delete and replace records identified for such processing in the MARC tapes? __________

    b. Can you reproduce the complete MARC file from your data base? __________

       (1) Do you retain all records on the MARC tapes in your data base (e.g., some libraries exclude juvenile records)? __________

       (2) Do you retain all data fields and subfields, both fixed and variable, that are in the MARC tapes in your data base? __________

           (a) If no, what data fields are not retained?

           ____

           ____

       (3) Do you retain the full identification of fields and subfields that are in the MARC tapes in your data base? __________

c. Does your system use the CIP records in the MARC tapes? ________

d. Does your system have the capability of modifying or correcting MARC records? (e.g., Do you add, delete, or replace data fields in the MARC record?) ________

e. Is your data base divided into separate files? ________

If yes, how: ________

(1) By age? ________

(2) Used/not used? ________

(3) MARC data/local data? ________

(4) Other (specify). ____________________________

____

f. Describe your file structure on comment sheets.

11. If you prepare input for your data base:

a. Is any part of this operation done on-line? ________

(1) Original keying. ________

(2) Proofreading. ________

(3) Correcting. ________

b. Who does the tagging (keying operator, cataloger, editor?____________________________

c. Does the system check for errors in input data?________

d. If original keying is done on-line, does the system assist the operator in any way (e.g. displaying tags in sequence, etc.)? ________

e. In correcting records, how much data has to be rekeyed?

(1) The entire record.

(2) The entire field.

(3) The entire subfield.

f. In changing (correcting) records, how are the changes controlled or monitored? (e.g., If more than one source is preparing cataloging copy, can any source change the cataloging data on file or must all changes be approved centrally?)

g. Does your character set include:

(1) Upper and lower case?

(2) MARC II specials and diacritics?

12. Does your data base contain copy/volume and location information?

C. PRODUCTS AND SERVICES

	On-line	Batch
1. Searching/selecting records from the file.		
a. Hours/day (On-line) or Frequency (Batch).		
b. Access points:		
(1) LC card no.		
(2) ISBN no.		
(3) Local accession no.		
(4) Main entry.		

		On-line	Batch
(5)	Title.		
(6)	Added entries.		
(7)	Subject entries.		
(8)	Publisher.		
(9)	Place published.		
(10)	Call no.		

(11) Other (specify). ______________________________

c. If your system uses a search code, describe it:

____

____

____

d. Record displayed (on-line system) or printed (batch system) for verification.

Explanation of terms and recording instructions.

(1) First Level Response Data: Data displayed or printed after the first search. For example, if 30 records match the search key or element, what bibliographic elements from these 30 records are displayed or printed at this time?

(2) Second Level Response Data: Data displayed or printed when additional data is requested for particular records or groups of records. For example, requesting to see, in full(er) form, data for records #2, #15, and #26 after scanning abbreviated forms of 30 records.

(3) If the complete data element is not displayed or printed, record the number of characters of it that are displayed or printed rather than a check mark in the appropriate column.

(4) If the full(er) form of the record is displayed or printed as First Level Response Data when there is only one match on the first search, do not record this case as First Level Response

Data. Note this case on the lines below and record the more general case, i.e., more than one response on first search, in the First Level Response column.

Full data is displayed when only one match.

Yes_____
No _____

	First Level Response Data		Second Level Response Data	
	On-line	Batch	On-line	Batch
LC card no.				
ISBN no.				
Local accession no.				
Main entry.				
Title.				
Added entries.				
Subject entries.				
Publisher.				
Place published.				
Call no.				
Other (specify)				

(5) Are tags displayed as well as data fields?

Yes_____
No _____

2. Printed products.

a. Cataloging copy (for verification, in lieu of proofslips). __________

Catalog Cards.

(1) Can extra copies of cards (e.g., main entries) be generated when desired? __________

(2) Can single copies of the main entry be generated as well as card sets? __________

(3) Are cards sorted by catalog or file into which they are to be filed? __________

(4) Are cards alphabetized within each file category? __________

(5) Can the sorting and alphabetizing be suppressed when desired (e.g., sort and alphabetize cards for the main library but allow card sets for the branch library to remain as a set)? __________

c. Shelf list cards. __________

(1) Do they contain copy/volume information? __________

d. Cross reference cards. __________

e. Pocket labels. __________

f. Spine labels. __________

g. Circulation cards. __________

h. Input to an automated circulation system. __________

i. Accession lists. __________

j. Book catalogs. __________

(1) Individual library catalogs. __________

(2) Individual branch catalogs. __________

(3) Union catalogs. __________

(4) Do they contain cross references? __________

(5) How are they arranged?

(a) One catalog. __________

(b) Two catalogs: (1) main and added entries, (2) subjects. __________

(c) Three catalogs: (1) authors, (2) titles, (3) subjects __________

(d) Other (specify). ______________________________

____

(6) Data elements displayed in catalogs:

Element	Main Entry	Added Entries	Subject Entries
LC card no.	____	____	____
ISBN no.	____	____	____
Main entry.	____	____	____
Title statement.	____	____	____
Edition statement.	____	____	____
Place published.	____	____	____
Publisher.	____	____	____
Date.	____	____	____
Notes.	____	____	____
Tracings.	____	____	____
Call no.	____	____	____
Copy/vol. data	____	____	____

k. Special bibliographies. ____________

l. Other (specify). ____

____

____

D. MANAGEMENT INFORMATION.

1. Does your system generate statistical and/or management data?

   a. No. of titles/vols. cataloged. (titles) ________
   (vols.) ________

   b. No. of titles/vols. cataloged by language? (titles) ________
   (vols) ________

   c. No. of titles/vols. cataloged by country of publication. (titles) ________
   (vols.) ________

   d. No. of titles/vols. cataloged by type of materials. (titles) ________
   (vols.) ________

   (1) How many types? ________

   e. No. of titles/vols. cataloged by subject category. (titles) ________
   (vols.) ________

   (1) How many categories? ________

   f. No. of titles/vols. cataloged by cataloger? (titles) ________
   (vols.) ________

   g. No. of added copies & volumes processed (e.g., An added copy processed separately or an added volume to a series that is cataloged as a series). ________

   h. No. of titles/vols. cataloged by source of cataloging copy:

   (1) L.C. (titles) ________
   (vols.) ________

   (2) L.C. MARC (titles) ________
   (vols.) ________

Cat 13

4. Do your programs generate costs for producing products and services? __________

5. Do these costs include overhead (e.g., program and data base maintenance, supervision, facilities)? __________

6. Is any statistical and/or management data available on-line? __________

7. If yes, describe ____

____

____

E. SOFTWARE

1. What language(s) are the programs in? ________

2. Are literals and constants loaded from tables? ________

3. How complete is the documentation? ________

   a. User instructions. ________

   b. Machine operator instructions. ________

   c. General system description. ________

   d. Program flow charts. ________

   e. Commented program listings. ________

4. How long has the system been in operation? ________

5. What percentage of the programs in the system have been in production more than 6 months? ________

6. How up-to-date is the documentation?________________________

   ____

7. Who should be contacted about acquiring your system?

   ____

   ____

8. If a transfer of your system were appropriate what thoughts do you have on a practical transfer procedure?

   ____

   ____

   ____

   ____

   ____

   ____

F. HARDWARE

1. Where is the hardware?

   a. Library. ______

   b. Institution's computer center. ______

   c. Service bureau. ______

   d. Other (specify). ______

2. Name(s) and quantity of processors. ______

3. Minimum core required to run the system. ______

4. Name(s) and quantity of display terminals. ______

5. Name(s) and quantity of line printers. ______

6. Name(s) and quantity of card readers. ______

7. Name(s) and quantity of card punches. ______

8. Name(s) and quantity of magnetic tape drives. ______

9. Name(s) and quantity of disc drives. ______

10. Number of disc packs. ______

11. Type of communication lines used.

    a. Normal telephone lines. (If used, record the baud rate instead of a yes-no check mark) ______

b. TWX. ________

c. Conditioned telephone lines. (If used, record the baud rate.) ________

d. Hard wire communications lines. ________

e. Other (specify). ________________________________

____

12. What special communication equipment is used? ________

____

____

13. Are there any special features (e.g., special character set, special editing features, programmability) on your terminals? ________________

____

____

14. Name(s) and quantity of input devices used for keying data records. ________________

____

15. Name(s) and quantity of devices used for proofreading and editing records. ________________

____

16. Name(s) and quantity of other hardware in the system.

____

____

____

17. If the same hardware is used for more than one of the functions noted above (e.g., the same device is used for both original keying and correcting) explain.

____

____

____

H. OPERATING COSTS

1. What is the cost of the system for:

   a. Hardware? __________

      (1) CPU costs/mo. __________

      (2) Input-output costs/mo. __________

   b. Personnel? __________

   c. Materials (forms, etc.)? __________

2. Is the hardware dedicated to the library? __________

   a. If not, what percentage is used by others? __________

3. What were the data conversion costs? __________

   a. How many titles were converted? __________

4. What are the present input encoding costs.? __________

5. What were the start-up programming and system design costs? __________

6. What unit operating costs do you have available? __________

____

7. Do you agree with any of these statements?

Automated systems will provide services at lower costs:

__________ in the near future.
__________ eventually.

Automated systems will provide better services:

__________ at lower costs.

   __________ in the near future.
   __________ eventually.

__________ at the same costs.

   __________ in the near future.
   __________ eventually.

__________ at higher costs.

   __________in the near future.
   __________ eventually.

Cat 18

I. FUTURE PLANS

1. Are you presently planning any major changes in your system?

____

____

____

____

____

2. If money were available, what changes do you think you would make in your system?

____

____

____

____

____

____

CIRCULATION SYSTEM

A. GENERAL CHARACTERISTICS.

1. Types and quantities of materials processed.

Type of Material		No. Processed Per Yr.*		
		Automated System	Manual System	Total
a. Monographs.	(titles)	____	____	____
	(vols.)	____	____	____
b. Serials...bound.	(titles)	____	____	____
	(vols.)	____	____	____
c. Serials...unbound.	(titles)	____	____	____
	(vols.)	____	____	____
d. Microforms.	(titles)	____	____	____
	(vols.)	____	____	____
e. Films.	(titles)	____	____	____
	(vols.)	____	____	____
f. Filmstrips.	(titles)	____	____	____
	(vols.)	____	____	____
g. Records.	(titles)	____	____	____
	(vols.)	____	____	____
h. Tapes.	(titles)	____	____	____
	(vols.)	____	____	____
i. Maps.	(titles)	____	____	____
	(vols.)	____	____	____
j. Government documents.	(titles)	____	____	____
	(vols.)	____	____	____
k. Manuscripts.	(titles)	____	____	____
	(vols.)	____	____	____
l. Items at bindery.	(titles)	____	____	____
	(vols.)	____	____	____

*If information on no. of records processed per year is not available, just check each category on a yes-no basis.

Type of Material (con't)		No. Processed Per Yr.*		
		Automated System	Manual System	Total
m. Interlibrary loan.	(titles)			
	(vols.)			
n. Items in reserve collection	(titles)			
	(vols.)			
o. Missing items.	(titles)			
	(vols.)			
p. Branches or departmental libraries.	(titles)			
	(vols.)			
q. Holds for waiting borrowers	(titles)			
	(vols.)			
r. Carrells.	(titles)			
	(vols.)			
s. New books on display.	(titles)			
	(vols.)			
t. Photoduplication.	(titles)			
	(vols.)			
u. Books being repaired.	(titles)			
	(vols.)			
v. Lost items.	(titles)			
	(vols.)			
w. Other (specify).				

*If information on no. of records processed per year is not available, just check each category on a yes-no basis.

2. What are the reasons for excluding the categories that are excluded?________________________________

3. Are the manual and automated systems integrated? Yes ______
No ______

(All of the following questions refer to the automated system only.)

4. What are the maximum number of volumes that can be processed by the existing system? ______

5. What loan periods do you have in your automated system by types of material and borrower?

Loan Period	Types of Material	Graduate	Under-Graduate	Faculty	Staff	Other

6. Type of book cards.

a. Punched, IBM. ______

b. Optically readable. ______

c. None used. ______

d. Punched, other. ______

e. Magnetically readable. ______

f. Other (specify).

______

7. Type of borrower card.

a. Punched, IBM. ______

b. Optically readable. ______

c. None used. ______

d. Punched, other. ______

e. Magnetically readable. ______

f. Other (specify).

______

8. If the system uses book cards, how was the conversion to automated system managed (e.g., were book cards made for all items in the library before starting the automated system?

9. What is the procedure when a borrower or bookcard is not present at borrowing time?

B. DATA BASE.

1. Borrower identification file.

   a. No. of records. ______
   b. No. of types of borrower. ______
   c. Maximum no. of characters per record. ______
   d. No. of data elements. (approximate) ______
   e. Is file on-line? ______
   f. Format?

      (1) Fixed. ______
      (2) Variable. ______
      (3) Fixed and variable. ______

g. Storage medium:

Disc______ Magnetic tape______ Punched cards______

Other (specify).______________________________

h. Does character set include:

(1) Upper and lower case? __________

(2) MARC II specials and diacritics? __________

2. Item identification file (book cards).

a. No. of records. __________

b. No. of types of items (e.g., books, periodicals, etc.). __________

c. Maximum no. of characters per record. __________

d. No. of data elements (approximate). __________

e. Is file on-line? __________

f. Format?

(1) Fixed. __________

(2) Variable. __________

(3) Fixed and variable. __________

g. Storage medium:

Disc______ Magnetic tape______ Punched cards______

Other (specify.______________________________

h. Does the character set include:

(1) Upper and lower case? __________

(2) MARC II specials and diacritics? __________

i. Is input to the item identification file a by product of the cataloging subsystem? __________

j. What bibliographic information is contained in the item identification file?

(1) Full cataloging description? ____

(2) Author, Full? ____

(3) Author, Abbreviated? (Record no. of characters.) ____

(4) Title, Full? ____

(5) Title, Abbreviated? (Record no. of characters). ____

(6) Date? ____

(7) Call number? ____

(8) Local identification number? ____

(9) Other (specify)____

k. Does character set include:

(1) Upper and lower case? ____

(2) MARC II specials and diacritics? ____

C. PRODUCTS AND SERVICES.

1. On-line query-access:

a. Hours/day. ____

b. Access points:

(1) Call No. ____

(2) Borrower: What items are charged to? ____

(3) Borrower: What items are being held for? ____

(4) Due date. ____

(5) Local ID No. ____

(6) Author. ____

(7) Title. __________

(8) Type of Borrower. __________

(9) Other (specify). ______________________________

2. Printed products:

a. Due date slips. __________

b. Overdue notices. __________

(1) What bibliographic information does the overdue notice contain (e.g., author, title, etc.)? __________

____

c. Lists of all borrowed items by call number? __________

(1) If yes, how often? __________

d. Lists of all borrowed items by type of borrower? __________

(1) If yes, how often? __________

e. Lists of items borrowed by selected borrowers. (e.g., X, Y, and Z are leaving the institution, what items are charged out to them.) __________

f. Lists of missing items? __________

(1) If yes, how often? __________

g. Lists of high demand items (to be reviewed for purchase of additional copies). __________

(1) If yes, how often? __________

D. MANAGEMENT INFORMATION.

1. Does your system generate statistical and/or management data?

yes________
no________

a. No. of vols. circulated. __________

b. No. of vols. circulated by type of material. __________

(1) How many types? __________

c. No. of vols. circulated by type of borrower. ________

d. No. of vols. circulated by subject or class (e.g., class numbers). ________

e. No. of vols. circulated by publication date. ________

2. Is there any computer analysis or interpretation of statistical data (e.g., comparisons with norms or previous performance)? ________

3. If yes, describe. ____

____

____

4. Do your programs generate costs for producing products and services? ________

5. Do these costs include overhead (e.g., program and data base maintenance, supervision, facilities)? ________

E. SOFTWARE

1. What language(s) are the programs in? ________

2. Are literals and constants loaded from tables? ________

3. How complete is the documentation? ________

a. User instructions. ________

b. Machine operator instructions. ________

c. General system description. ________

d. Program flow charts. ________

e. Commented program listings. ________

4. How long has the system been in operation? ________

5. What percentage of the programs in the system have been in production more than 6 months? ________

6. How up-to-date is the documentation? ____________________

____

7. Who should be contacted about acquiring your system?

____

____

8. If a transfer of your system were appropriate what thoughts do you have on a practical transfer procedure?

____

____

____

____

____

____

F. HARDWARE

1. Where is the hardware?

   a. Library. ________

   b. Institution's computer center. ________

   c. Service bureau. ________

   d. Other (specify). ______________________________

   ____

2. Name(s) and quantity of processors. ______________________________

____

3. Minimum core required to run the system. ______________________________

____

4. Name(s) and quantity of display terminals. ______________________________

____

5. Name(s) and quantity of line printers. ______________________________

____

6. Name(s) and quantity of card readers. ____________________

____

7. Name(s) and quantity of card punches. ____________________

____

8. Name(s) and quantity of magnetic tape drives. ____________________

____

9. Name(s) and quantity of disc drives. ____________________

____

10. Number of disc packs. ____________________

11. Type of communication lines used.

    a. Normal telephone lines. (If used, record the baud rate instead of a yes-no check mark) ________

    b. TWX. ________

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    ____

12. What special communication equipment is used? ________

____

____

13. Are there any special features (e.g., special character set, special editing features, programmability) on your terminals? ____________________

____

____

14. Name and quantity of input devices for item identification cards. ______________________________

____

15. Name(s) and quantity of input devices for borrower identification cards. ______________________________

____

16. Name(s) and quantity of charging/discharging devices.

____

____

17. Name(s) and quantity of other hardware in the system.

____

____

18. If the same hardware is used for more than one of the functions noted above (e.g., the same device is used to make item identification cards and borrower cards), explain.

____

____

____

G. OPERATING COSTS

1. What is the cost of the system for:

   a. Hardware? __________

      (1) CPU costs/mo. __________

      (2) Input-output costs/mo. __________

   b. Personnel? __________

   c. Materials (forms, etc.)? __________

2. Is the hardware dedicated to the library? ________

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a. How many titles were converted? ________

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____

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- ________ eventually.

________ at the same costs.

- ________ in the near future.
- ________ eventually.

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- ________in the near future.
- ________ eventually.

H. FUTURE PLANS

1. Are you presently planning any major changes in your system?

2. If money were available, what changes do you think you would make in your system?